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# OBSERVATIONS OF POSITION, OCEAN DEPTHS, AND GRAVITY TAKEN FROM THE FRAM II AND CAMP I DRIFTING ICE STATIONS

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by B. Allen, J. Ardal, K. Hunkins, T. Lee, T. O. Manley and W. Tiemann

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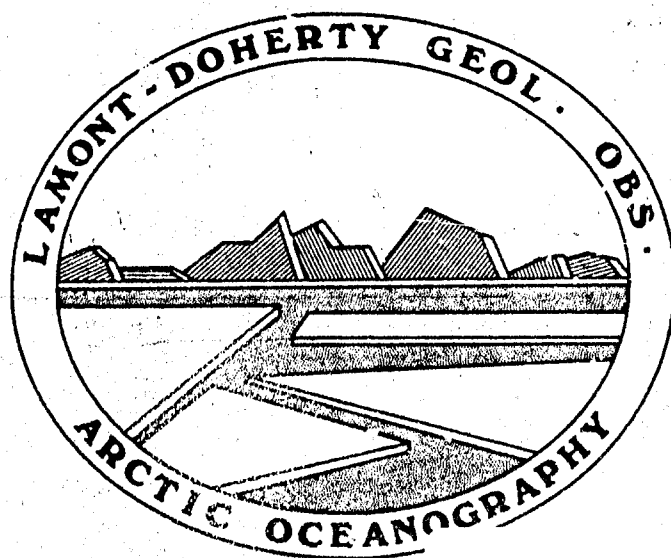
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OBSERVATIONS OF POSITION, OCEAN DEPTHS,  
AND GRAVITY TAKEN FROM THE  
FRAM II AND CAMP I DRIFTING ICE STATIONS.

prepared by

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B. Allen, J. Ardai, K. Hunkins, T. Lee, T. O. Manley and W. Tiemann

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Lamont-Doherty Geological Observatory of Columbia University  
New York, N. Y. 10964

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ABSTRACT

→ This report contains geophysical data collected by the Lamont group at the FRAM II and Camp I drifting stations. These data include station positions determined by satellite navigation, echo soundings, ice floe azimuths, magnetic declination and gravity readings. ←

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## Introduction

FRAM II was a research station established on drifting pack ice to carry out underwater acoustic, geophysical, and oceanographic studies in the Arctic Ocean with primary financial support from the Office of Naval Research. Aircraft for establishing and maintaining the station were based at Nord, Greenland through cooperation of the Danish government and the Commission for Scientific Research in Greenland. FRAM II was established March 19, 1980 at  $86^{\circ}51'N$   $023^{\circ}12'W$  and the scientific program began on March 31st after the camp had been relocated following ice breakup at the initial site. The program continued until May 4th when the camp was at  $85^{\circ}46'N$   $023^{\circ}39'W$ . Camp I was established later about 300 km north of FRAM II as a satellite station (fig. 1).

Investigators from Lamont-Doherty Geological Observatory carried out observations of position by satellite navigation, ocean depth and the earth's gravity field at FRAM II. Position by celestial navigation, and floe azimuth were observed at Camp I. These observations are reported here in the form of tables and figures. In order to make it available quickly, only the data are reported without detailed analysis or interpretation.

The Lamont group also conducted acoustic and oceanographic measurements which will be reported separately. The observations at FRAM II were made by Jay Ardai, Charles Monjo and Tai Lee. The measurements at Camp I were made by Barry Allen.

## Navigation

All positions at FRAM II were determined with the U. S. Navy Transit satellite navigation system. Transit satellites circle the earth in 107-minute polar orbits at an altitude of approximately 100 km.

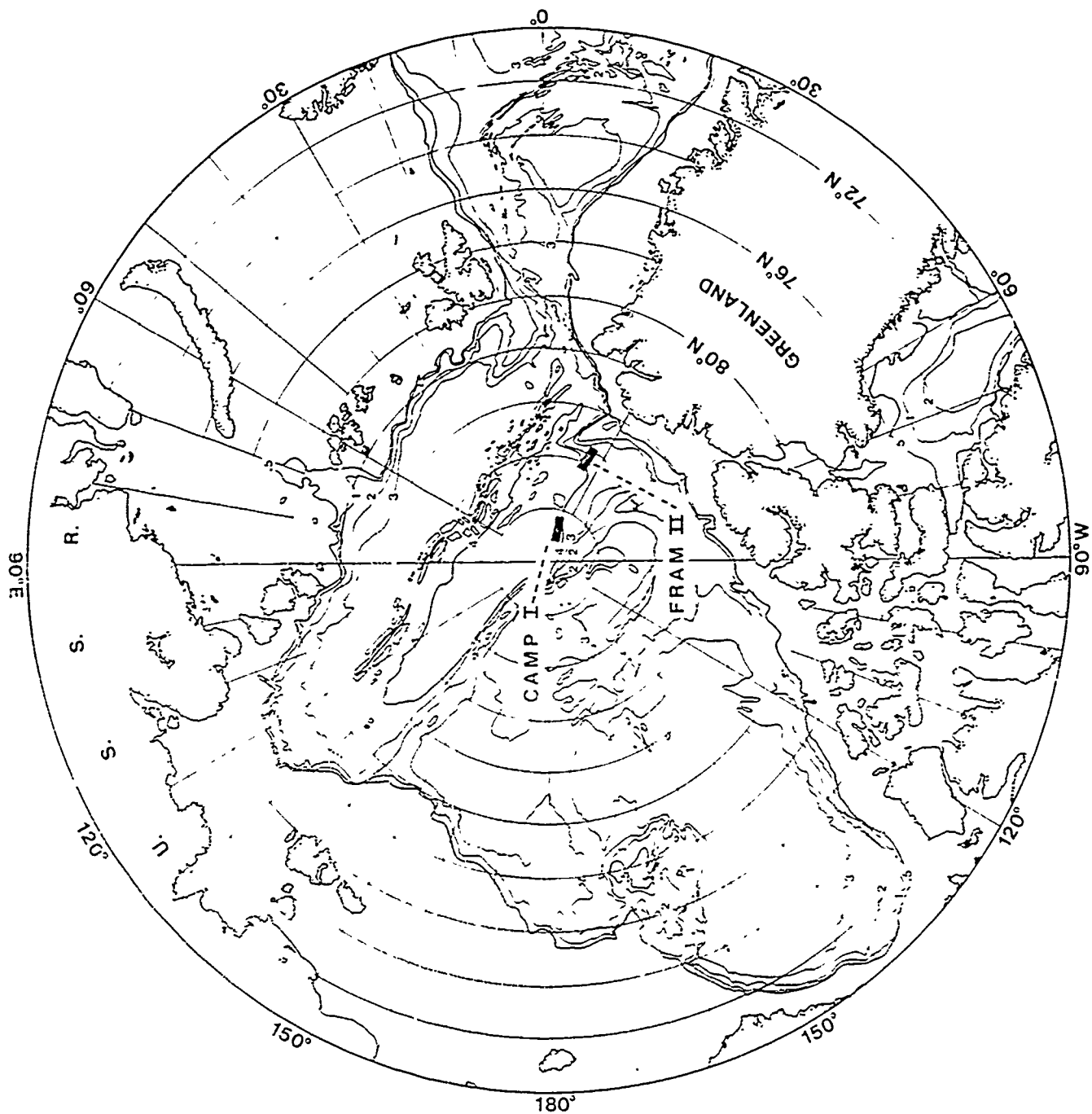


Figure 1. Locations of Fram II and Camp I Drifting Stations

Each satellite continuously transmits position data as a function of time. By measuring the change in the Doppler frequency of the received signals as the satellite approaches, passes, and recedes, the position of the station relative to the satellites path can be determined with great precision. The number of satellite passes at a given site over a given time will be greatest at the poles. In the Arctic the interval between fixes is therefore short.

The fixes at FRAM II were determined with a Magnavox MX 1502 satellite navigation set. The MX 1502 system was introduced in 1977 and is a rugged, portable, nearly automatic navigation system. The fixes and associated information are stored on magnetic tape. These data are also displayed visually and they were logged manually as often as possible in case the tape should malfunction.

Fixes calculated with the MX 1502 sets are based on the World Geodetic System-1972 coordinates. "Standard deviations" in latitude and longitude based on Doppler data residuals are calculated automatically by the 1502 for each fix. All fixes with "standard deviations" greater than 90 m in latitude and 136 m in longitude were eliminated from the data set. These cutoff values were arrived at by calculating the mean and standard deviation of the "standard deviations" for all fixes of each instrument separately. All fixes with "standard deviations" greater than the mean plus one standard deviation were eliminated in two successive trials.

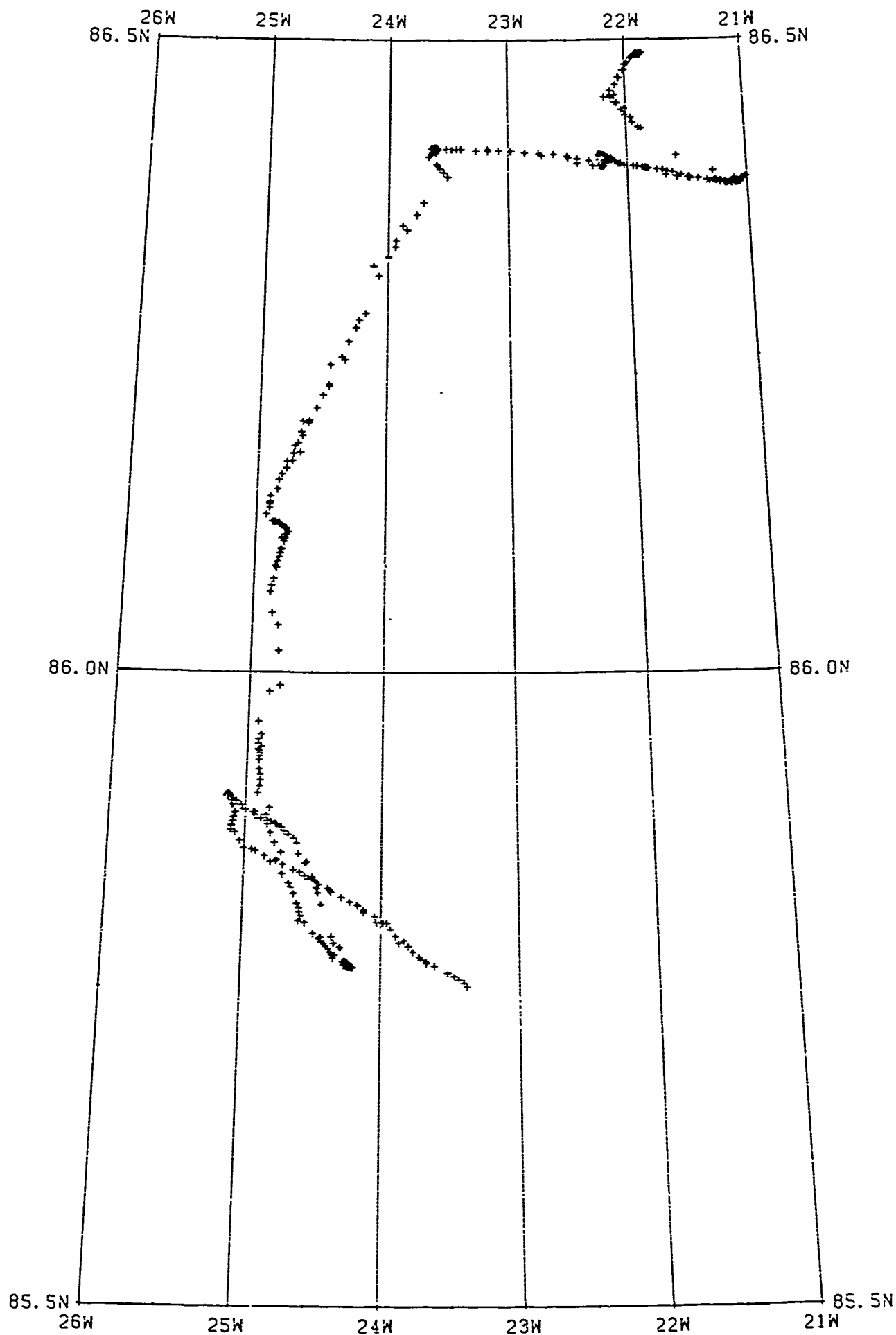
Although it had been intended to fix the positions of Camp I also with satellite navigation, no reliable fixes were obtained with the Magnavox 706 set used there and only celestial navigation was obtained. Sun shots were taken with a Wild T-2 theodolite on a daily basis when cloud cover permitted. The errors are estimated to be  $\pm$  1 km for these sun fixes.



POSITIONS OF THE FRAM II DRIFTING STATION  
DETERMINED BY THE MX1502 SATELLITE NAVIGATION SET

Key to Column Headings:

SN	Serial number of satellite receiver unit
DY	Day
MON	Month
YEAR	Year
GMT	Greenwich mean time
LATITUDE	North latitude in decimal degrees
LONGITUDE	Longitude in decimal degrees, (negative implies west longitude)
EL	Maximum elevation of satellite above horizon in degrees
I	Number of iterations in the computation
DP	Number of 23/28 - second Doppler counts
SAT	Last three digits of satellite identification number
STDY	Standard deviation of latitude in meters
STDX	Standard deviation of longitude in meters



SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	1	APR	1980	1215	40.439334	-21.847313	31	3	32	140	62.0	85.0
30	1	APR	1980	1255	40.430853	-21.857531	33	2	32	190	44.0	17.0
30	1	APR	1980	1922	40.439745	-21.864454	34	3	32	140	61.0	29.0
30	1	APR	1980	2108	40.428754	-21.893623	33	3	32	140	63.0	23.0
30	1	APR	1980	2125	40.426553	-21.910271	75	2	32	110	53.0	79.0
30	1	APR	1980	2151	40.424419	-21.877277	75	3	24	190	62.0	65.0
30	1	APR	1980	2251	40.425983	-21.897675	66	2	33	140	54.0	39.0
30	2	APR	1980	41	40.426755	-21.906738	74	2	21	140	62.0	121.0
30	2	APR	1980	100	40.483159	-21.864858	62	3	28	110	47.0	122.0
30	2	APR	1980	124	40.483297	-21.903023	70	3	30	190	50.0	17.0
30	2	APR	1980	247	40.483190	-21.901268	73	3	24	110	50.0	49.0
30	2	APR	1980	310	40.483572	-21.931911	73	2	26	190	83.0	54.0
30	2	APR	1980	602	40.485580	-21.945883	75	3	27	140	71.0	60.0
30	2	APR	1980	748	40.481659	-21.975189	72	2	26	140	47.0	38.0
30	2	APR	1980	809	40.479950	-21.991932	72	3	30	110	37.0	29.0
30	2	APR	1980	831	40.480225	-21.997570	60	3	29	190	47.0	78.0
30	2	APR	1980	936	40.476151	-22.002205	72	3	32	140	57.0	25.0
30	2	APR	1980	1018	40.475706	-22.016523	72	3	30	190	55.0	47.0
30	2	APR	1980	1123	40.473306	-22.054082	77	3	29	140	62.0	57.0
30	2	APR	1980	1206	40.469425	-22.051479	64	2	27	190	50.0	25.0
30	2	APR	1980	1353	40.464530	-22.055144	69	3	31	190	48.0	24.0
30	2	APR	1980	1541	40.459717	-22.131538	73	3	33	190	35.0	33.0
30	2	APR	1980	1644	40.450549	-22.043301	73	3	30	140	51.0	71.0
30	2	APR	1980	1704	40.450151	-22.128347	66	3	35	110	50.0	16.0
30	2	APR	1980	1729	40.454834	-22.142293	41	3	31	190	52.0	115.0
30	2	APR	1980	1830	40.454132	-22.126812	60	3	26	140	59.0	34.0
30	2	APR	1980	1850	40.453312	-22.121002	57	3	35	110	44.0	19.0
30	2	APR	1980	2015	40.450545	-22.093777	62	3	24	140	54.0	25.0
30	2	APR	1980	2037	40.450195	-22.071793	73	3	28	110	53.0	54.0
30	2	APR	1980	2101	40.445257	-22.013195	74	4	34	190	72.0	116.0
30	2	APR	1980	2202	40.444752	-22.033576	64	3	26	140	55.0	29.0
30	2	APR	1980	2244	40.440323	-22.097545	72	3	30	190	60.0	41.0
30	2	APR	1980	2344	40.433553	-21.954636	70	3	32	140	45.0	47.0
30	3	APR	1980	35	40.434704	-21.944603	69	3	30	190	54.0	20.0
30	3	APR	1980	155	40.430954	-21.944706	70	3	27	110	41.0	53.0
30	3	APR	1980	221	40.430044	-21.974067	71	3	33	190	67.0	37.0
30	3	APR	1980	929	40.436279	-21.957645	75	3	20	190	55.0	50.0
30	3	APR	1980	1515	40.436574	-21.921152	77	3	33	110	45.0	18.0
30	3	APR	1980	2134	40.439477	-21.107471	74	3	33	110	45.0	103.0
30	3	APR	1980	2346	40.434130	-21.046177	70	3	32	140	62.0	22.0
30	4	APR	1980	236	40.434130	-21.077119	70	3	34	140	62.0	54.0
30	4	APR	1980	1214	40.436752	-21.020722	63	3	34	140	61.0	14.0
30	4	APR	1980	1632	40.434712	-21.058745	65	3	33	140	61.0	74.0
30	4	APR	1980	2201	40.437177	-21.074251	70	3	35	110	67.0	14.0
30	4	APR	1980	2257	40.437241	-21.063152	64	3	32	140	51.0	24.0
30	4	APR	1980	2327	40.437551	-21.071561	71	3	31	140	61.0	31.0
30	4	APR	1980	2352	40.437222	-21.074272	74	3	28	200	70.0	152.0
30	4	APR	1980	2352	40.437307	-21.098175	71	3	29	140	51.0	73.0
30	5	APR	1980	20	40.437414	-21.060352	45	3	24	110	58.0	116.0
30	5	APR	1980	44	40.437453	-21.074728	69	3	32	160	77.0	19.0
30	5	APR	1980	207	40.437002	-21.074448	75	3	34	110	66.0	41.0
30	5	APR	1980	230	40.437336	-21.073401	71	3	33	140	62.0	44.0
30	5	APR	1980	257	40.435441	-21.064207	60	3	30	200	72.0	30.0
30	5	APR	1980	355	40.436154	-21.064634	64	3	35	110	61.0	21.0
30	5	APR	1980	415	40.435506	-21.120553	76	3	31	190	71.0	61.0
30	5	APR	1980	511	40.435545	-21.131256	77	3	22	140	70.0	55.0
30	5	APR	1980	627	40.437551	-21.133731	71	3	23	200	53.0	47.0
30	5	APR	1980	710	40.437552	-21.127622	72	3	25	140	64.0	24.0
30	5	APR	1980	810	40.437552	-21.174367	74	3	24	200	60.0	121.0
30	5	APR	1980	947	40.437551	-21.144116	71	3	30	140	50.0	25.0
30	5	APR	1980	1124	40.437551	-21.154291	74	3	26	140	55.0	33.0
30	5	APR	1980	1228	40.437551	-21.153551	72	3	24	140	52.0	110.0
30	5	APR	1980	1312	40.437551	-21.153551	75	3	31	190	55.0	24.0
30	5	APR	1980	1531	40.437551	-21.153551	75	3	32	200	72.0	57.0
30	5	APR	1980	1555	40.437551	-21.221712	71	3	35	160	63.0	34.0
30	5	APR	1980	1555	40.437551	-21.221712	75	3	35	200	70.0	24.0
30	5	APR	1980	1624	40.437551	-21.221712	75	3	24	140	66.0	115.0

FRAM 2

NAVIGATION - ORIGINAL

SN	DT	MON	YEAR	GPT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	5	APR	1980	1647	46.332439	-21.264374	79	3	36	190	34.0	59.0
30	5	APR	1980	1701	46.337464	-21.270779	63	3	25	200	39.0	43.0
30	5	APR	1980	1740	46.337470	-21.278210	67	3	26	140	56.0	47.0
30	5	APR	1980	1810	46.337558	-21.311535	65	3	29	110	43.0	17.0
30	5	APR	1980	1920	46.338214	-21.338311	63	3	22	140	70.0	29.0
30	5	APR	1980	2113	46.338990	-21.409309	63	3	30	140	55.0	25.0
30	5	APR	1980	2144	46.338447	-21.480129	79	3	32	110	60.0	120.0
30	5	APR	1980	2225	46.331251	-21.455012	67	3	28	140	61.0	53.0
30	5	APR	1980	2354	46.330448	-21.499119	69	3	25	190	87.0	28.0
30	6	APR	1980	46	46.3392131	-21.576897	75	3	29	140	48.0	112.0
30	6	APR	1980	118	46.333052	-21.549725	79	3	34	110	41.0	70.0
30	6	APR	1980	140	46.331220	-21.587002	70	3	23	190	86.0	36.0
30	6	APR	1980	305	46.334852	-21.623360	71	3	35	110	37.0	26.0
30	6	APR	1980	327	46.332070	-21.680244	74	3	25	190	79.0	73.0
30	6	APR	1980	419	46.335474	-21.664499	63	3	32	140	62.0	105.0
30	6	APR	1980	455	46.335744	-21.708302	67	3	36	110	41.0	15.0
30	6	APR	1980	756	46.3347171	-21.755718	71	3	31	140	53.0	38.0
30	6	APR	1980	824	46.334570	-21.8229412	71	3	31	140	51.0	17.0
30	6	APR	1980	844	46.334570	-21.845257	74	3	32	110	41.0	40.0
30	6	APR	1980	844	46.334170	-21.8556335	77	4	22	190	45.0	73.0
30	6	APR	1980	1124	46.334245	-21.875278	73	3	32	140	61.0	29.0
30	6	APR	1980	1344	46.334000	-21.814441	79	3	24	140	60.0	71.0
30	6	APR	1980	1530	46.334494	-21.946690	75	3	36	110	53.0	68.0
30	6	APR	1980	1640	46.334494	-22.025836	65	3	35	110	52.0	29.0
30	6	APR	1980	1722	46.334494	-22.059828	71	3	36	140	42.0	51.0
30	6	APR	1980	1840	46.334494	-22.079376	69	3	36	110	52.0	15.0
30	6	APR	1980	2021	46.334494	-22.100661	64	3	34	140	48.0	26.0
30	6	APR	1980	2021	46.334494	-22.126040	52	3	33	140	55.0	17.0
30	6	APR	1980	2255	46.334739	-22.153242	75	3	35	110	51.0	67.0
30	6	APR	1980	2305	46.334739	-22.154503	65	3	31	140	63.0	42.0
30	6	APR	1980	2305	46.335702	-22.144550	71	3	34	140	50.0	28.0
30	6	APR	1980	2305	46.335702	-22.134442	43	3	30	110	49.0	114.0
30	6	APR	1980	2305	46.335702	-22.168289	69	3	36	190	56.0	15.0
30	6	APR	1980	2305	46.335702	-22.172504	74	3	36	110	42.0	43.0
30	6	APR	1980	2305	46.335702	-22.185604	72	3	36	190	57.0	38.0
30	6	APR	1980	2305	46.335702	-22.207076	75	3	36	140	52.0	70.0
30	6	APR	1980	2305	46.335702	-22.224430	72	3	36	140	56.0	33.0
30	6	APR	1980	2305	46.335702	-22.210117	31	3	39	140	52.0	74.0
30	6	APR	1980	2305	46.335702	-22.231171	71	3	31	140	67.0	23.0
30	6	APR	1980	2305	46.335702	-22.242257	74	3	32	110	67.0	61.0
30	6	APR	1980	2305	46.335702	-22.252257	72	3	35	190	62.0	35.0
30	6	APR	1980	2305	46.335702	-22.262257	75	3	35	140	72.0	24.0
30	6	APR	1980	2305	46.335702	-22.272257	75	3	35	190	67.0	26.0
30	6	APR	1980	2305	46.335702	-22.282257	74	3	35	110	63.0	117.0
30	6	APR	1980	2305	46.335702	-22.292257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.302257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.312257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.322257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.332257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.342257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.352257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.362257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.372257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.382257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.392257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.402257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.412257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.422257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.432257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.442257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.452257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.462257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.472257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.482257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.492257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.502257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.512257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.522257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.532257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.542257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.552257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.562257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.572257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.582257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.592257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.602257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.612257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.622257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.632257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.642257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.652257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.662257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.672257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.682257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.692257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.702257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.712257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.722257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.732257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.742257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.752257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.762257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.772257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.782257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.792257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.802257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.812257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.822257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.832257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.842257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.852257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.862257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.872257	75	3	35	190	67.0	37.0
30	6	APR	1980	2305	46.335702	-22.882257	75	3	35	190	67.0	37.0

SN	DY	MON	YEAR	GWT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDY
30	8	APR	1980	1419	80.404968	-22.224712	70	3	32	190	61.0	36.0
30	8	APR	1980	1524	80.405258	-22.218170	66	3	32	200	77.0	23.0
30	8	APR	1980	1545	80.404724	-22.207981	68	3	36	110	49.0	24.0
30	8	APR	1980	1606	80.405151	-22.226074	76	3	30	190	51.0	62.0
30	8	APR	1980	1651	80.407379	-22.236729	70	3	30	140	90.0	93.0
30	8	APR	1980	1837	80.405334	-22.218830	64	3	31	140	65.0	53.0
30	8	APR	1980	1854	80.404724	-22.237537	74	3	28	200	86.0	95.0
30	8	APR	1980	2024	80.404922	-22.214836	62	3	26	140	59.0	22.0
30	8	APR	1980	2210	80.405762	-22.216770	65	3	31	140	62.0	39.0
30	8	APR	1980	2356	80.405243	-22.227966	72	3	29	140	53.0	75.0
30	9	APR	1980	11	80.405365	-22.192245	74	3	23	200	59.0	84.0
30	9	APR	1980	100	80.404709	-22.213730	69	3	28	190	85.0	27.0
30	9	APR	1980	157	80.406281	-22.218128	68	3	22	200	75.0	48.0
30	9	APR	1980	246	80.405137	-22.217522	72	3	23	190	70.0	53.0
30	9	APR	1980	517	80.404572	-22.195885	77	3	31	140	56.0	50.0
30	9	APR	1980	704	80.403931	-22.205799	72	4	23	140	59.0	26.0
30	9	APR	1980	807	80.404449	-22.200069	80	3	24	190	47.0	110.0
30	9	APR	1980	851	80.404190	-22.207420	72	3	29	140	62.0	23.0
30	9	APR	1980	954	80.404236	-22.209904	72	3	27	190	63.0	50.0
30	9	APR	1980	1036	80.403961	-22.215225	70	3	32	140	55.0	42.0
30	9	APR	1980	1142	80.403915	-22.207756	68	3	33	190	50.0	23.0
30	9	APR	1980	1310	80.403534	-22.176655	77	3	36	110	50.0	83.0
30	9	APR	1980	1330	80.403412	-22.212524	68	3	27	190	70.0	32.0
30	9	APR	1980	1643	80.403198	-22.209442	60	3	35	110	51.0	16.0
30	9	APR	1980	1932	80.403122	-22.201714	63	3	14	140	74.0	44.0
30	9	APR	1980	2016	80.402542	-22.225075	73	3	34	110	45.0	46.0
30	9	APR	1980	2038	80.402679	-22.188545	78	4	24	190	80.0	119.0
30	9	APR	1980	2225	80.402651	-22.200466	71	3	36	190	78.0	48.0
30	10	APR	1980	12	80.402326	-22.205868	69	4	29	190	60.0	22.0
30	10	APR	1980	137	80.402393	-22.197210	70	3	36	110	39.0	48.0
30	10	APR	1980	158	80.402357	-22.211929	71	3	37	190	59.0	28.0
30	10	APR	1980	325	80.402374	-22.208195	69	3	36	110	37.0	21.0
30	10	APR	1980	344	80.401590	-22.219475	70	3	26	190	68.0	71.0
30	10	APR	1980	422	80.401325	-22.211689	66	3	29	200	60.0	25.0
30	10	APR	1980	900	80.400690	-22.208167	75	3	38	190	49.0	55.0
30	10	APR	1980	1053	80.400391	-22.211467	69	3	25	190	61.0	30.0
30	10	APR	1980	1134	80.400833	-22.226611	80	3	25	140	72.0	85.0
30	10	APR	1980	1240	80.400280	-22.215912	67	3	28	190	61.0	29.0
30	10	APR	1980	1408	80.400757	-22.199867	72	3	33	110	51.0	48.0
30	10	APR	1980	1424	80.400452	-22.222637	70	3	34	190	47.0	31.0
30	10	APR	1980	1615	80.401031	-22.224910	77	3	28	190	54.0	72.0
30	10	APR	1980	1654	80.400944	-22.208912	69	3	28	140	60.0	59.0
30	10	APR	1980	1741	80.400574	-22.213970	80	3	33	110	49.0	17.0
30	10	APR	1980	1830	80.400533	-22.212280	64	3	33	140	53.0	25.0
30	10	APR	1980	1928	80.400452	-22.222560	70	3	35	110	48.0	34.0
30	10	APR	1980	2026	80.400526	-22.214828	63	3	32	140	40.0	16.0
30	10	APR	1980	2114	80.400192	-22.237793	76	3	32	110	59.0	105.0
30	10	APR	1980	2130	80.400330	-22.195793	74	3	32	190	88.0	69.0
30	10	APR	1980	2213	80.400757	-22.217140	60	3	32	140	50.0	35.0
30	10	APR	1980	2322	80.400299	-22.204556	69	3	38	190	66.0	23.0
30	10	APR	1980	2359	80.401001	-22.222057	73	3	28	140	59.0	94.0
30	11	APR	1980	109	80.400299	-22.218014	69	3	28	190	53.0	18.0
30	11	APR	1980	250	80.400772	-22.224281	74	3	31	190	63.0	51.0
30	11	APR	1980	423	80.400223	-22.211159	68	3	32	110	58.0	22.0
30	11	APR	1980	500	80.400520	-22.216156	67	3	33	200	57.0	29.0
30	11	APR	1980	520	80.400421	-22.201302	70	3	35	140	52.0	43.0
30	11	APR	1980	510	80.400909	-22.190842	73	5	24	190	45.0	80.0
30	11	APR	1980	854	80.401077	-22.213264	72	3	31	140	67.0	26.0
30	11	APR	1980	1004	80.400559	-22.200573	71	3	33	190	48.0	34.0
30	11	APR	1980	1042	80.400452	-22.222622	70	3	30	140	63.0	51.0
30	11	APR	1980	1151	80.400360	-22.217670	67	3	29	190	50.0	25.0
30	11	APR	1980	1520	80.400452	-22.224480	74	3	36	190	51.0	52.0
30	11	APR	1980	1602	80.399558	-22.190487	73	3	25	140	70.0	80.0
30	11	APR	1980	1652	80.400244	-22.211590	68	3	35	110	47.0	14.0
30	11	APR	1980	1743	80.401093	-22.211746	66	3	23	140	56.0	29.0
30	11	APR	1980	1834	80.400341	-22.217567	68	3	35	110	48.0	24.0
30	12	APR	1980	428	80.400543	-22.201954	80	3	31	140	68.0	83.0
30	12	APR	1980	614	80.400140	-22.213306	73	3	29	140	64.0	43.0

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## NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDZ
30	12	APR	1980	802	86.400253	-22.212875	71	3	23	140	81.0	34.0
30	12	APR	1980	1136	86.400955	-22.234055	80	3	26	140	65.0	83.0
30	12	APR	1980	1249	86.400620	-22.219509	67	3	33	190	47.0	18.0
30	12	APR	1980	1510	86.401123	-22.186779	77	4	28	140	48.0	108.0
30	12	APR	1980	1604	86.400925	-22.208660	67	3	34	110	62.0	22.0
30	12	APR	1980	1624	86.401169	-22.225094	78	3	33	190	56.0	96.0
30	12	APR	1980	1656	86.400833	-22.193958	68	3	32	140	51.0	46.0
30	12	APR	1980	1843	86.400421	-22.206715	63	3	35	140	44.0	19.0
30	12	APR	1980	2029	86.400543	-22.213943	63	3	29	140	39.0	17.0
30	12	APR	1980	2124	86.400345	-22.234436	79	3	31	110	60.0	132.0
30	12	APR	1980	2215	86.400146	-22.220341	67	3	28	140	54.0	41.0
30	12	APR	1980	2331	86.400513	-22.192471	69	3	38	190	72.0	22.0
30	13	APR	1980	2	86.400345	-22.233501	74	3	28	140	48.0	83.0
30	13	APR	1980	522	86.400101	-22.199078	76	3	29	140	60.0	51.0
30	13	APR	1980	710	86.400726	-22.206894	72	3	23	140	58.0	27.0
30	13	APR	1980	825	86.401962	-22.224789	77	3	28	190	67.0	90.0
30	13	APR	1980	857	86.400146	-22.212070	72	3	30	140	59.0	24.0
30	13	APR	1980	1012	86.400177	-22.203423	70	3	31	190	52.0	33.0
30	13	APR	1980	1044	86.400223	-22.218540	78	3	26	140	66.0	57.0
30	13	APR	1980	1200	86.400803	-22.206409	67	3	31	190	43.0	18.0
30	13	APR	1980	1503	86.400085	-22.210171	66	3	29	200	73.0	24.0
30	13	APR	1980	1604	86.400360	-22.200291	72	3	33	140	45.0	60.0
30	13	APR	1980	1646	86.400421	-22.217697	67	3	25	200	78.0	41.0
30	13	APR	1980	1751	86.400665	-22.210888	65	3	23	140	64.0	34.0
30	13	APR	1980	1833	86.400391	-22.225399	74	3	32	200	78.0	82.0
30	13	APR	1980	1937	86.400146	-22.209087	63	3	21	140	81.0	18.0
30	13	APR	1980	2124	86.400284	-22.215691	64	3	31	140	49.0	27.0
30	13	APR	1980	2242	86.400620	-22.206188	70	3	28	190	65.0	33.0
30	13	APR	1980	2310	86.400421	-22.223228	70	3	35	140	52.0	61.0
30	13	APR	1980	2350	86.401031	-22.195484	74	3	31	200	49.0	64.0
30	14	APR	1980	135	86.400742	-22.204514	67	3	24	200	65.0	43.0
30	14	APR	1980	322	86.400528	-22.209641	65	3	29	200	61.0	28.0
30	14	APR	1980	402	86.400341	-22.225739	79	3	29	190	83.0	136.0
30	14	APR	1980	430	86.400269	-22.198532	79	3	30	140	60.0	72.0
30	14	APR	1980	508	86.400330	-22.216740	67	3	34	200	67.0	40.0
30	14	APR	1980	617	86.400269	-22.210686	73	3	35	140	56.0	28.0
30	14	APR	1980	654	86.400848	-22.222126	74	3	31	200	56.0	67.0
30	14	APR	1980	804	86.400376	-22.207710	71	3	35	140	54.0	18.0
30	14	APR	1980	952	86.400345	-22.214104	74	3	29	140	83.0	45.0
30	14	APR	1980	1110	86.401031	-22.211429	57	3	22	190	84.0	41.0
30	14	APR	1980	1139	86.400345	-22.234880	32	3	30	140	67.0	97.0
30	14	APR	1980	1210	86.401016	-22.192412	73	3	28	200	67.0	69.0
30	14	APR	1980	1253	86.400655	-22.213486	57	3	33	140	61.0	24.0
30	14	APR	1980	1443	86.400772	-22.218311	72	3	34	140	58.0	47.0
30	14	APR	1980	1512	86.400574	-22.187820	75	3	29	140	59.0	117.0
30	14	APR	1980	1540	86.400655	-22.208767	66	3	33	200	77.0	24.0
30	14	APR	1980	1632	86.400925	-22.226986	80	3	24	190	53.0	114.0
30	14	APR	1980	1659	86.400696	-22.205235	68	3	30	140	56.0	45.0
30	14	APR	1980	1726	86.400299	-22.216427	69	3	24	200	68.0	46.0
30	14	APR	1980	1815	86.400421	-22.209747	63	3	35	140	50.0	21.0
30	14	APR	1980	1911	86.400040	-22.226359	77	3	32	200	89.0	131.0
30	14	APR	1980	1946	86.400238	-22.230309	72	3	34	110	64.0	61.0
30	14	APR	1980	2032	86.400742	-22.223362	63	3	36	140	51.0	20.0
30	14	APR	1980	2153	86.401016	-22.216213	72	3	32	190	77.0	49.0
30	14	APR	1980	2218	86.401031	-22.236622	67	3	30	140	47.0	39.0
30	14	APR	1980	2340	86.400940	-22.236858	59	3	29	190	42.0	30.0
30	15	APR	1980	4	86.401541	-22.267712	75	4	34	140	47.0	93.0
30	15	APR	1980	28	86.400503	-22.233974	70	3	31	200	82.0	75.0
30	15	APR	1980	126	86.400253	-22.288967	70	3	36	190	65.0	29.0
30	15	APR	1980	214	86.404419	-22.321507	65	3	23	200	75.0	41.0
30	15	APR	1980	312	86.402252	-22.421249	75	3	34	190	87.0	91.0
30	15	APR	1980	400	86.406126	-22.422298	65	3	24	200	86.0	44.0
30	15	APR	1980	525	86.407196	-22.495331	75	3	33	140	60.0	46.0
30	15	APR	1980	546	86.408005	-22.508961	69	3	23	200	81.0	46.0
30	15	APR	1980	712	86.409775	-22.621052	71	3	32	140	53.0	20.0
30	15	APR	1980	834	86.408537	-22.721512	75	3	25	190	73.0	81.0
30	15	APR	1980	990	86.410461	-22.744263	72	3	34	140	59.0	28.0
30	15	APR	1980	1021	86.410343	-22.562610	69	3	33	190	52.0	32.0

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NAVIGATION - ORIGINAL

SN	DAY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	15	APR	1980	1208	85.412170	-22.979729	67	3	30	190	56.0	25.0
30	15	APR	1980	1356	85.412537	-23.082081	69	3	33	190	63.0	35.0
30	15	APR	1980	1543	85.413331	-23.175941	70	3	31	190	54.0	66.0
30	15	APR	1980	1607	85.411896	-23.173828	71	3	30	140	36.0	45.0
30	15	APR	1980	1754	85.412521	-23.273876	65	3	28	140	56.0	34.0
30	15	APR	1980	2044	85.413696	-23.439281	77	4	27	110	69.0	115.0
30	15	APR	1980	2104	85.413301	-23.398582	75	3	35	190	85.0	84.0
30	15	APR	1980	2250	85.413132	-23.477612	70	3	27	190	72.0	29.0
30	15	APR	1980	2312	85.413081	-23.522644	71	3	28	140	47.0	63.0
30	16	APR	1980	37	85.412979	-23.604609	69	3	23	190	84.0	30.0
30	16	APR	1980	224	85.413666	-23.593147	72	3	24	190	75.0	59.0
30	16	APR	1980	620	85.413895	-23.595039	72	3	17	140	77.0	60.0
30	16	APR	1980	744	85.414505	-23.592777	79	3	30	190	47.0	92.0
30	16	APR	1980	932	85.414627	-23.605659	71	3	33	190	46.0	37.0
30	16	APR	1980	1306	85.414642	-23.606121	68	3	37	190	57.0	25.0
30	16	APR	1980	1454	85.414307	-23.621212	72	3	35	190	51.0	50.0
30	16	APR	1980	1511	85.414078	-23.604790	66	3	20	200	77.0	24.0
30	16	APR	1980	1641	85.414764	-23.629314	81	3	26	190	66.0	135.0
30	16	APR	1980	1702	85.413696	-23.592175	68	3	29	140	56.0	43.0
30	16	APR	1980	1848	85.414734	-23.608097	63	3	22	140	55.0	22.0
30	16	APR	1980	2034	85.414308	-23.629185	63	3	27	140	75.0	29.0
30	16	APR	1980	2220	85.414642	-23.639885	68	3	23	140	75.0	71.0
30	16	APR	1980	2348	85.413205	-23.629086	69	3	29	190	77.0	26.0
30	17	APR	1980	7	85.413096	-23.653820	76	3	32	140	51.0	118.0
30	17	APR	1980	340	85.410614	-23.607063	83	3	30	140	72.0	122.0
30	17	APR	1980	528	85.411118	-23.635326	75	3	27	140	84.0	51.0
30	17	APR	1980	715	85.410233	-23.648808	71	3	27	140	82.0	33.0
30	17	APR	1980	902	85.409607	-23.664814	73	3	25	140	65.0	39.0
30	17	APR	1980	1049	85.407394	-23.668873	79	3	27	140	77.0	77.0
30	17	APR	1980	1610	85.401581	-23.599850	71	3	31	140	52.0	59.0
30	17	APR	1980	1756	85.400421	-23.592316	65	3	33	140	52.0	26.0
30	17	APR	1980	1942	85.398056	-23.570576	62	3	31	140	47.0	18.0
30	17	APR	1980	2128	85.395137	-23.540146	65	3	24	140	49.0	31.0
30	17	APR	1980	2315	85.391674	-23.509254	72	3	22	140	54.0	83.0
30	18	APR	1980	435	85.371124	-23.709824	77	3	31	140	58.0	59.0
30	18	APR	1980	622	85.361518	-23.767792	72	3	31	140	72.0	35.0
30	18	APR	1980	753	85.353333	-23.880466	76	3	31	190	53.0	89.0
30	18	APR	1980	810	85.349945	-23.842545	71	3	32	140	56.0	18.0
30	18	APR	1980	940	85.341432	-23.934025	70	3	34	190	57.0	38.0
30	18	APR	1980	957	85.330563	-23.939377	75	3	35	140	52.0	41.0
30	18	APR	1980	1128	85.328079	-24.000557	68	3	35	190	62.0	27.0
30	18	APR	1980	1144	85.321148	-24.118492	63	4	24	140	83.0	132.0
30	18	APR	1980	1315	85.313243	-24.073154	67	3	33	190	65.0	32.0
30	18	APR	1980	1704	85.283870	-24.176126	56	3	27	140	60.0	39.0
30	18	APR	1980	1811	85.276700	-24.227032	71	4	32	200	78.0	72.0
30	18	APR	1980	1850	85.272614	-24.251320	62	3	24	140	66.0	17.0
30	18	APR	1980	2037	85.261396	-24.308685	63	3	23	140	74.0	37.0
30	18	APR	1980	2210	85.247070	-24.334663	70	4	35	190	78.0	42.0
30	18	APR	1980	2223	85.249374	-24.350653	67	4	22	140	63.0	66.0
30	18	APR	1980	2328	85.243332	-24.451214	74	3	22	200	72.0	131.0
30	19	APR	1980	114	85.227707	-24.457390	66	3	34	200	66.0	40.0
30	19	APR	1980	143	85.226364	-24.456858	69	4	21	190	86.0	48.0
30	19	APR	1980	300	85.219264	-24.503540	63	3	29	200	61.0	25.0
30	19	APR	1980	446	85.208484	-24.553009	65	3	30	200	47.0	25.0
30	19	APR	1980	632	85.199310	-24.610352	72	4	27	200	67.0	63.0
30	19	APR	1980	703	85.198502	-24.657721	82	4	31	190	48.0	123.0
30	19	APR	1980	718	85.197342	-24.616569	70	4	27	140	61.0	19.0
30	19	APR	1980	850	85.190048	-24.667623	72	3	78	190	42.0	56.0
30	19	APR	1980	905	85.187144	-24.657463	72	4	22	140	77.0	26.0
30	19	APR	1980	1038	85.181503	-24.690533	67	3	26	190	73.0	52.0
30	19	APR	1980	1052	85.174986	-24.715664	78	4	24	140	72.0	66.0
30	19	APR	1980	1149	85.173474	-24.671272	72	4	29	200	80.0	81.0
30	19	APR	1980	1226	85.173065	-24.723022	66	3	35	190	62.0	24.0
30	19	APR	1980	1334	85.167236	-24.732956	65	4	33	200	60.0	29.0
30	19	APR	1980	1413	85.166540	-24.773427	69	4	34	190	62.0	44.0
30	19	APR	1980	1518	85.151270	-24.775528	64	4	27	200	65.0	21.0
30	19	APR	1980	1704	85.150617	-24.811172	65	4	30	200	64.0	37.0
30	19	APR	1980	1849	85.151176	-24.833103	74	4	22	200	81.0	108.0

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NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	19	APR	1980	2121	86.144440	-24.843090	71	4	27	190	90.0	64.0
30	20	APR	1980	6	86.139160	-24.896343	70	4	31	200	48.0	43.0
30	20	APR	1980	152	86.134044	-24.897793	63	4	30	200	44.0	22.0
30	20	APR	1980	240	86.133072	-24.900146	72	4	29	190	69.0	80.0
30	20	APR	1980	338	86.130173	-24.900627	63	4	32	200	65.0	24.0
30	20	APR	1980	710	86.124969	-24.923019	75	4	30	200	48.0	70.0
30	20	APR	1980	1323	86.119522	-24.871510	67	4	31	190	64.0	30.0
30	20	APR	1980	1411	86.119171	-24.849266	64	3	26	200	61.0	23.0
30	20	APR	1980	1556	86.118973	-24.853607	64	4	27	200	60.0	19.0
30	20	APR	1980	1741	86.118973	-24.846935	69	4	28	200	63.0	52.0
30	20	APR	1980	2258	86.118011	-24.821983	76	4	28	200	47.0	75.0
30	21	APR	1980	4	86.117561	-24.820023	66	4	27	190	88.0	28.0
30	21	APR	1980	44	86.117111	-24.816063	66	3	29	200	43.0	30.0
30	21	APR	1980	230	86.116028	-24.801323	62	3	28	200	49.0	22.0
30	21	APR	1980	748	86.114273	-24.751158	79	4	26	200	57.0	108.0
30	21	APR	1980	859	86.113968	-24.753058	71	3	27	190	49.0	53.0
30	21	APR	1980	1046	86.113358	-24.763786	65	3	28	190	54.0	29.0
30	21	APR	1980	1234	86.111115	-24.758381	65	4	32	190	86.0	38.0
30	21	APR	1980	1304	86.110809	-24.747982	66	4	33	200	61.0	35.0
30	21	APR	1980	1421	86.109085	-24.763276	70	4	31	190	56.0	47.0
30	21	APR	1980	1449	86.108612	-24.761971	63	4	31	200	62.0	20.0
30	21	APR	1980	1608	86.105891	-24.797169	78	4	28	190	54.0	90.0
30	21	APR	1980	1634	86.105442	-24.770222	65	4	32	200	69.0	33.0
30	21	APR	1980	1819	86.103516	-24.779282	72	4	33	200	58.0	60.0
30	21	APR	1980	2256	86.097656	-24.797398	63	4	28	130	47.0	17.0
30	21	APR	1980	2336	86.097168	-24.798473	71	4	31	200	48.0	51.0
30	22	APR	1980	102	86.094208	-24.806271	68	4	33	190	86.0	37.0
30	22	APR	1980	122	86.094254	-24.807068	64	4	31	200	57.0	31.0
30	22	APR	1980	308	86.090790	-24.812637	62	4	33	200	50.0	19.0
30	22	APR	1980	454	86.087296	-24.824417	65	4	32	200	48.0	28.0
30	22	APR	1980	640	86.084122	-24.840130	73	4	27	200	58.0	63.0
30	22	APR	1980	751	86.082581	-24.829876	73	4	22	130	54.0	41.0
30	22	APR	1980	1145	86.073715	-24.848267	64	4	28	190	66.0	31.0
30	22	APR	1980	1332	86.069695	-24.863014	67	4	30	190	53.0	29.0
30	22	APR	1980	1520	86.063600	-24.871887	74	4	33	190	65.0	76.0
30	22	APR	1980	2725	86.046397	-24.850756	78	4	25	200	55.0	96.0
30	23	APR	1980	40	86.037277	-24.802496	70	4	32	130	54.0	52.0
30	23	APR	1980	844	86.016391	-24.791023	64	4	22	130	54.0	33.0
30	23	APR	1980	1745	85.984624	-24.771381	73	5	25	130	59.0	116.0
30	23	APR	1980	1950	85.964894	-24.848490	60	4	26	140	51.0	21.0
30	24	APR	1980	610	85.951099	-24.823876	70	4	20	200	49.0	47.0
30	24	APR	1980	1117	85.930989	-24.900276	72	4	30	200	48.0	52.0
30	24	APR	1980	1312	85.947311	-24.918221	54	4	32	200	57.0	28.0
30	24	APR	1980	1457	85.943151	-24.925425	52	4	32	200	52.0	20.0
30	24	APR	1980	1526	85.941277	-24.897484	71	4	23	140	47.0	57.0
30	24	APR	1980	1642	85.939265	-24.918747	65	4	24	200	58.0	37.0
30	24	APR	1980	1712	85.937729	-24.912186	63	4	27	140	52.0	29.0
30	24	APR	1980	1827	85.935604	-24.908245	73	4	32	200	70.0	81.0
30	24	APR	1980	1853	85.933635	-24.906065	60	4	28	140	57.0	23.0
30	24	APR	1980	2044	85.930573	-24.911419	62	4	14	140	81.0	48.0
30	24	APR	1980	2344	85.923452	-24.906998	69	4	29	200	45.0	42.0
30	25	APR	1980	130	85.919312	-24.897400	62	4	30	200	48.0	23.0
30	25	APR	1980	310	85.914515	-24.897557	61	4	29	200	46.0	18.0
30	25	APR	1980	502	85.910172	-24.901123	55	4	23	200	71.0	37.0
30	25	APR	1980	646	85.904724	-24.910843	74	4	26	200	36.0	52.0
30	25	APR	1980	1019	85.893042	-24.823227	78	5	26	200	79.0	125.0
30	25	APR	1980	1100	85.884504	-24.927849	79	5	24	140	68.0	76.0
30	25	APR	1980	1204	85.887258	-24.846214	54	4	30	200	64.0	45.0
30	25	APR	1980	1349	85.880173	-24.835281	62	4	31	200	53.0	20.0
30	25	APR	1980	1534	85.873322	-24.812005	62	4	32	200	55.0	20.0
30	25	APR	1980	1719	85.865677	-24.776804	67	4	28	200	60.0	42.0
30	25	APR	1980	1904	85.857727	-24.726142	77	5	30	200	67.0	113.0
30	25	APR	1980	2236	85.849973	-24.718651	75	4	26	200	42.0	62.0
30	26	APR	1980	22	85.833691	-24.689933	65	4	26	200	47.0	33.0
30	26	APR	1980	195	85.830536	-24.652916	72	4	20	110	83.0	88.0
30	26	APR	1980	208	85.825577	-24.630760	60	4	23	200	42.0	20.0
30	26	APR	1980	354	85.817627	-24.603384	61	4	26	200	44.0	18.0
30	26	APR	1980	440	85.814331	-24.589138	64	4	21	110	77.0	17.0



SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDZ
30	26	APR	1980	540	85.810806	-24.587158	67	4	27	200	33.0	25.0
30	26	APR	1980	628	85.807724	-24.576530	68	4	22	110	53.0	24.0
30	26	APR	1980	726	85.804031	-24.591995	79	5	22	200	57.0	94.0
30	26	APR	1980	815	85.802567	-24.546093	77	5	21	110	72.0	90.0
30	26	APR	1980	1056	85.793961	-24.483604	72	4	31	200	59.0	71.0
30	26	APR	1980	1149	85.791260	-24.430588	77	5	22	110	76.0	122.0
30	26	APR	1980	1242	85.789581	-24.445057	64	4	28	200	38.0	22.0
30	26	APR	1980	1336	85.787628	-24.422512	68	4	23	110	71.0	40.0
30	26	APR	1980	1427	85.786163	-24.406994	61	4	22	200	56.0	19.0
30	26	APR	1980	1522	85.784042	-24.390221	63	4	25	110	66.0	17.0
30	26	APR	1980	1612	85.782150	-24.373051	62	4	30	200	59.0	27.0
30	26	APR	1980	1709	85.779526	-24.363293	63	4	25	110	63.0	26.0
30	26	APR	1980	1757	85.777719	-24.352016	70	4	31	200	63.0	58.0
30	26	APR	1980	1856	85.777206	-24.325111	69	4	23	110	82.0	70.0
30	26	APR	1980	1942	85.774597	-24.336609	81	7	24	200	59.0	129.0
30	26	APR	1980	2229	85.771667	-24.268227	87	8	25	110	41.0	42.0
30	27	APR	1980	100	85.769470	-24.256096	62	4	29	200	53.0	29.0
30	27	APR	1980	204	85.769531	-24.246319	67	4	22	110	41.0	27.0
30	27	APR	1980	246	85.768537	-24.243713	59	4	24	200	55.0	23.0
30	27	APR	1980	351	85.768372	-24.236427	64	4	24	110	46.0	18.0
30	27	APR	1980	432	85.767975	-24.239456	62	4	19	200	71.0	29.0
30	27	APR	1980	539	85.767426	-24.230198	65	4	21	110	50.0	23.0
30	27	APR	1980	618	85.767670	-24.229355	71	4	32	200	44.0	50.0
30	27	APR	1980	726	85.767303	-24.224472	73	4	26	110	45.0	45.0
30	27	APR	1980	1135	85.767365	-24.193863	68	4	28	200	63.0	49.0
30	27	APR	1980	1320	85.767593	-24.201916	61	4	31	200	51.0	21.0
30	27	APR	1980	1434	85.767258	-24.197483	65	4	26	110	70.0	26.0
30	27	APR	1980	1621	85.767334	-24.210339	63	4	25	110	56.0	20.0
30	27	APR	1980	1650	85.767776	-24.222336	64	4	18	200	56.0	40.0
30	27	APR	1980	1835	85.768021	-24.229698	74	5	20	200	64.0	99.0
30	28	APR	1980	303	85.768875	-24.245770	64	4	28	110	41.0	20.0
30	28	APR	1980	636	85.769333	-24.255215	69	4	30	110	42.0	30.0
30	28	APR	1980	825	85.769394	-24.265137	79	4	35	110	40.0	67.0
30	28	APR	1980	836	85.770630	-24.246761	66	6	13	190	65.0	70.0
30	28	APR	1980	1159	85.770676	-24.233696	76	5	31	110	45.0	67.0
30	28	APR	1980	1212	85.770035	-24.238453	65	4	19	200	65.0	40.0
30	28	APR	1980	1345	85.771362	-24.240780	77	5	23	190	88.0	123.0
30	28	APR	1980	1719	85.772544	-24.254255	64	4	34	110	54.0	21.0
30	28	APR	1980	2106	85.783371	-24.257971	67	4	31	190	75.0	42.0
30	28	APR	1980	2236	85.786743	-24.334877	70	4	30	190	55.0	68.0
30	29	APR	1980	39	85.791309	-24.351597	65	4	25	190	63.0	35.0
30	29	APR	1980	731	85.815456	-24.430309	68	4	23	190	73.0	28.0
30	29	APR	1980	1121	85.826233	-24.454636	62	4	30	190	59.0	22.0
30	29	APR	1980	1256	85.829445	-24.465088	63	4	15	200	67.0	33.0
30	29	APR	1980	1308	85.831314	-24.471619	65	4	29	190	65.0	32.0
30	29	APR	1980	1456	85.835842	-24.483456	73	4	31	190	62.0	68.0
30	29	APR	1980	1625	85.838848	-24.496409	64	4	24	190	45.0	33.0
30	29	APR	1980	2144	85.859921	-24.553661	66	4	21	190	43.0	34.0
30	29	APR	1980	2203	85.851044	-24.540314	65	4	27	190	81.0	33.0
30	30	APR	1980	136	85.857407	-24.603725	69	4	28	190	90.0	53.0
30	30	APR	1980	451	85.865766	-24.617401	71	4	20	190	75.0	37.0
30	30	APR	1980	657	85.869263	-24.639847	77	4	17	190	69.0	133.0
30	30	APR	1980	844	85.872104	-24.680595	68	4	35	190	52.0	36.0
30	30	APR	1980	1032	85.875275	-24.713837	63	4	25	190	83.0	36.0
30	30	APR	1980	1159	85.877475	-24.732903	69	4	20	130	45.0	25.0
30	30	APR	1980	1219	85.878250	-24.739990	63	4	33	190	58.0	24.0
30	30	APR	1980	1406	85.880264	-24.759989	69	4	31	190	60.0	47.0
30	30	APR	1980	1533	85.881073	-24.781601	67	4	19	190	79.0	58.0
30	30	APR	1980	1554	85.882645	-24.808041	79	4	34	190	56.0	123.0
30	30	APR	1980	1656	85.882531	-24.839245	66	4	22	200	59.0	43.0
30	30	APR	1980	1718	85.883484	-24.835419	61	4	19	190	61.0	35.0
30	30	APR	1980	1843	85.884427	-24.905361	76	5	28	200	56.0	93.0
30	30	APR	1980	1906	85.885223	-24.882156	60	4	26	190	54.0	21.0
30	30	APR	1980	2114	85.888152	-24.924890	67	4	28	190	73.0	37.0
30	30	APR	1980	2214	85.889601	-24.940411	75	4	26	200	38.0	65.0
30	1	MAY	1980	0	85.894187	-24.949018	66	4	23	200	31.0	29.0
30	1	MAY	1980	47	85.894219	-25.019970	66	4	25	190	87.0	41.0
30	1	MAY	1980	146	85.895355	-25.032555	60	4	24	200	34.0	16.0

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NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDZ
30	1	MAY	1980	332	45.898483	-25.066265	61	4	29	200	43.0	19.0
30	1	MAY	1980	518	45.900574	-25.097661	67	4	27	200	33.0	27.0
30	1	MAY	1980	704	45.902130	-25.122803	78	4	29	200	26.0	53.0
30	1	MAY	1980	922	45.903732	-25.125755	66	4	18	130	69.0	26.0
30	1	MAY	1980	942	45.903290	-25.128113	64	4	27	190	61.0	35.0
30	1	MAY	1980	1035	45.903854	-25.119244	73	4	26	200	54.0	78.0
30	1	MAY	1980	1220	45.903885	-25.125130	64	4	31	200	63.0	36.0
30	1	MAY	1980	1317	45.903931	-25.137310	66	4	31	190	53.0	33.0
30	1	MAY	1980	1405	45.903525	-25.125034	61	4	23	200	48.0	16.0
30	1	MAY	1980	1441	45.902512	-25.109104	72	4	30	140	56.0	71.0
30	1	MAY	1980	1504	45.902725	-25.140793	74	4	32	190	57.0	75.0
30	1	MAY	1980	1520	45.902344	-25.123104	62	4	30	200	45.0	20.0
30	1	MAY	1980	1628	45.901398	-25.115551	64	4	24	140	53.0	32.0
30	1	MAY	1980	1736	45.900467	-25.110062	69	4	29	200	62.0	56.0
30	1	MAY	1980	1814	45.898549	-25.106712	60	4	23	140	65.0	33.0
30	1	MAY	1980	2000	45.895355	-25.091576	61	4	27	140	54.0	21.0
30	1	MAY	1980	2212	45.889633	-25.070244	65	4	27	190	69.0	24.0
30	1	MAY	1980	2252	45.888977	-25.076778	70	4	29	200	43.0	50.0
30	1	MAY	1980	2358	45.885834	-25.080994	65	4	26	190	72.0	29.0
30	2	MAY	1980	38	45.885590	-25.082321	62	4	29	200	41.0	22.0
30	2	MAY	1980	224	45.882757	-25.087254	60	4	30	200	39.0	15.0
30	2	MAY	1980	306	45.882401	-25.092316	79	5	18	140	88.0	130.0
30	2	MAY	1980	410	45.879544	-25.097542	62	4	31	200	47.0	25.0
30	2	MAY	1980	454	45.878577	-25.096096	71	4	24	140	69.0	49.0
30	2	MAY	1980	556	45.875319	-25.102184	71	4	30	200	31.0	35.0
30	2	MAY	1980	641	45.873459	-25.070049	68	4	22	140	72.0	23.0
30	2	MAY	1980	828	45.867142	-25.032784	70	4	36	140	52.0	27.0
30	2	MAY	1980	1016	45.860401	-25.003113	78	4	22	140	71.0	72.0
30	2	MAY	1980	1040	45.860321	-24.942459	62	4	24	190	67.0	26.0
30	2	MAY	1980	1113	45.859100	-24.913364	69	4	25	200	46.0	40.0
30	2	MAY	1980	1258	45.855299	-24.848213	61	4	29	200	40.0	17.0
30	2	MAY	1980	1349	45.852148	-24.762959	77	5	26	140	66.0	117.0
30	2	MAY	1980	1415	45.850525	-24.805630	70	4	24	190	67.0	46.0
30	2	MAY	1980	1443	45.851700	-24.765816	60	4	29	200	47.0	15.0
30	2	MAY	1980	1536	45.848541	-24.713131	67	4	29	140	37.0	32.0
30	2	MAY	1980	1722	45.844101	-24.635555	61	4	31	140	42.0	17.0
30	2	MAY	1980	1813	45.842331	-24.557074	74	5	25	200	72.0	101.0
30	2	MAY	1980	1908	45.839447	-24.551331	60	4	31	140	45.0	17.0
30	2	MAY	1980	1936	45.837000	-24.523285	73	4	27	190	71.0	71.0
30	2	MAY	1980	2054	45.834157	-24.466431	61	4	30	140	57.0	41.0
30	2	MAY	1980	2123	45.832444	-24.449780	60	4	31	190	64.0	24.0
30	2	MAY	1980	2241	45.824773	-24.380505	72	4	24	140	42.0	63.0
30	2	MAY	1980	2309	45.826278	-24.371895	63	4	33	190	68.0	20.0
30	2	MAY	1980	2330	45.826534	-24.359203	60	4	20	200	52.0	56.0
30	3	MAY	1980	110	45.822413	-24.283657	60	4	31	200	32.0	13.0
30	3	MAY	1980	302	45.815771	-24.222350	60	4	28	200	45.0	13.0
30	3	MAY	1980	401	45.816711	-24.166466	73	4	23	140	82.0	75.0
30	3	MAY	1980	548	45.815074	-24.163128	65	4	19	200	51.0	36.0
30	3	MAY	1980	543	45.812592	-24.120331	70	4	26	140	61.0	37.0
30	3	MAY	1980	634	45.810337	-24.122219	75	4	28	200	37.0	59.0
30	3	MAY	1980	803	45.807663	-24.039513	64	4	26	140	56.0	55.0
30	3	MAY	1980	923	45.802811	-24.028698	75	4	30	140	80.0	58.0
30	3	MAY	1980	950	45.802584	-23.981888	63	4	29	190	66.0	32.0
30	3	MAY	1980	1005	45.802277	-23.953552	75	5	20	200	65.0	80.0
30	3	MAY	1980	1138	45.797455	-23.930060	62	4	32	190	59.0	23.0
30	3	MAY	1980	1320	45.792221	-23.887694	70	4	27	190	82.0	36.0
30	3	MAY	1980	1444	45.785581	-23.828175	70	4	30	140	80.0	65.0
30	3	MAY	1980	1513	45.786404	-23.866730	76	4	32	190	55.0	85.0
30	3	MAY	1980	1630	45.784038	-23.797467	62	4	34	140	46.0	25.0
30	3	MAY	1980	1815	45.779355	-23.766350	69	4	30	140	55.0	19.0
30	3	MAY	1980	2002	45.775757	-23.720478	61	4	33	140	49.0	24.0
30	3	MAY	1980	2034	45.773544	-23.706539	68	4	32	190	70.0	43.0
30	3	MAY	1980	2149	45.771245	-23.669273	63	4	24	140	48.0	48.0
30	3	MAY	1980	2220	45.770554	-23.667698	63	4	26	190	79.0	32.0
30	3	MAY	1980	2335	45.766542	-23.608303	79	5	33	140	38.0	125.0
30	4	MAY	1980	309	45.763240	-23.513618	76	4	34	140	57.0	59.0
30	4	MAY	1980	456	45.760370	-23.469261	60	4	29	140	52.0	76.0
30	4	MAY	1980	644	45.757575	-23.433405	67	4	27	140	59.0	16.0

## FRAM 2

## NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	OP	SAT	STDY	STDX
30	4	MAY	1980	831	85.755060	-23.398399	71	4	30	140	57.0	30.0
30	4	MAY	1980	1018	85.751968	-23.375206	90	5	33	140	65.0	83.0

### Kalman Filtering of Position Data

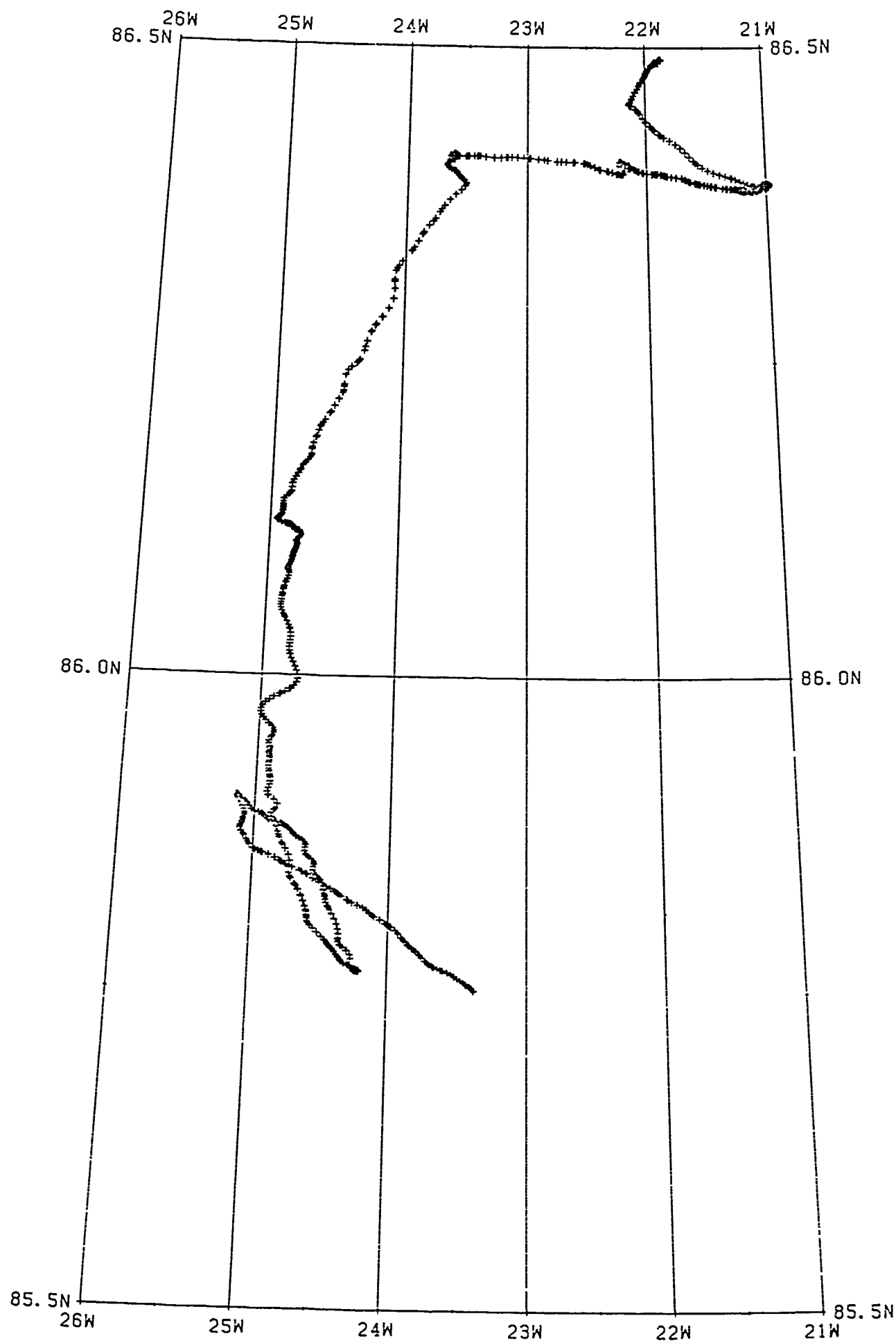
A Kalman filtering technique was used on the FRAM II navigation data set. At FRAM II the density of the fixes ranged from 7 to 29 per day. The main purpose of the filter was to smooth the track and provide fixes at evenly-spaced time intervals of one hour. In addition, ice velocities were computed at the same evenly-spaced intervals. More detail on the Kalman filtering techniques for irregularly-spaced data sets is given in Thorndike and Manley (1980). Removal of oscillations in the ice motion with periods greater than that of the inertial period was estimated to be less than 5%.

## SMOOTHED HOURLY POSITIONS AND ICE VELOCITIES OF THE FRAM II DRIFTING STATION

## Key to column headings

DY	Day
MON	Month
YEAR	Year
GMT	Greenwich mean time
JULDAY	Relative Julian Day, Day 1 = Jan 01, 1980
LATITUDE	North latitude in decimal degrees
LONGITUDE	Longitude in decimal degrees, (negative implies west longitude)
N-VEL	North-South component of ice velocity (cm/sec) positive values indicate north velocity negative values indicate south velocity
E-VEL	East-West component of ice velocity (cm/sec) positive values indicate east velocity negative values indicate west velocity

Note that along with the evenly spaced data is the filtered original data with associated ice velocity.



FRA 4 2 NAVIGATION - KAUMAN

DY	MON	YEAR	GWT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
1	APR	1980	1215	92.510414	80.489861	-21.863552	0.0	-0.1
1	APR	1980	1255	92.538200	80.489868	-21.864040	0.1	-0.2
1	APR	1980	1300	92.541604	80.489868	-21.864128	0.1	-0.2
1	APR	1980	1400	92.583330	80.489975	-21.865515	0.5	-0.3
1	APR	1980	1500	92.625000	80.490196	-21.866909	0.8	-0.3
1	APR	1980	1600	92.666604	80.490448	-21.868843	0.7	-0.5
1	APR	1980	1700	92.708336	80.490570	-21.872696	0.0	-1.0
1	APR	1980	1800	92.750000	80.490410	-21.879305	-1.0	-1.5
1	APR	1980	1900	92.791604	80.489952	-21.887589	-1.8	-1.5
1	APR	1980	1922	92.800940	80.489731	-21.890377	-2.0	-1.3
1	APR	1980	2000	92.833330	80.489311	-21.894093	-2.0	-0.8
1	APR	1980	2100	92.875000	80.488754	-21.895607	-1.2	0.2
1	APR	1980	2108	92.880554	80.488708	-21.895451	-1.0	0.3
1	APR	1980	2125	92.892365	80.488640	-21.894918	-0.5	0.4
1	APR	1980	2151	92.910423	80.488617	-21.893978	0.2	0.3
1	APR	1980	2200	92.916604	80.488632	-21.893787	0.4	0.2
1	APR	1980	2254	92.954103	80.488631	-21.893911	0.6	0.0
1	APR	1980	2300	92.958330	80.488645	-21.893906	0.5	0.0
2	APR	1980	0	93.000000	80.488823	-21.892279	-0.7	0.6
2	APR	1980	41	93.023473	80.488609	-21.890369	-1.2	0.2
2	APR	1980	100	93.041004	80.488480	-21.890451	-1.3	-0.4
2	APR	1980	100	93.041604	80.488480	-21.890451	-1.3	-0.4
2	APR	1980	124	93.058327	80.488297	-21.892197	-1.4	-1.3
2	APR	1980	200	93.083330	80.487991	-21.898684	-1.8	-2.8
2	APR	1980	247	93.115974	80.487488	-21.912905	-2.1	-3.8
2	APR	1980	300	93.125000	80.487343	-21.917255	-2.0	-3.8
2	APR	1980	310	93.131950	80.487236	-21.920582	-2.0	-3.7
2	APR	1980	400	93.155004	80.486771	-21.935047	-1.3	-2.5
2	APR	1980	500	93.208330	80.486389	-21.943544	-1.5	-1.0
2	APR	1980	600	93.250000	80.485497	-21.950182	-4.3	-1.9
2	APR	1980	602	93.251396	80.485451	-21.950525	-4.5	-2.0
2	APR	1980	700	93.291504	80.483551	-21.965029	-7.3	-3.5
2	APR	1980	748	93.325005	80.481522	-21.980520	-8.1	-3.5
2	APR	1980	800	93.333330	80.481003	-21.984137	-8.6	-3.3
2	APR	1980	809	93.339577	80.480606	-21.988692	-8.0	-3.1
2	APR	1980	831	93.354458	80.479652	-21.992361	-8.0	-2.7
2	APR	1980	900	93.375000	80.478386	-21.998875	-8.1	-2.5
2	APR	1980	936	93.400002	80.476768	-22.007435	-8.0	-3.1
2	APR	1980	1000	93.415004	80.475724	-22.014843	-8.1	-3.6
2	APR	1980	1014	93.424105	80.474709	-22.021484	-9.0	-4.5
2	APR	1980	1100	93.455330	80.472481	-22.038800	-9.7	-4.4
2	APR	1980	1123	93.471304	80.471313	-22.047900	-9.0	-3.7
2	APR	1980	1200	93.500000	80.469620	-22.057110	-8.0	-2.7
2	APR	1980	1250	93.534173	80.469380	-22.056535	-7.4	-2.7
2	APR	1980	1300	93.541004	80.467087	-22.070693	-7.4	-2.6
2	APR	1980	1353	93.573305	80.464745	-22.086763	-5.5	-3.7
2	APR	1980	1400	93.583330	80.464417	-22.089066	-8.5	-3.8
2	APR	1980	1500	93.625000	80.461503	-22.107941	-9.1	-3.0
2	APR	1980	1541	93.653473	80.459541	-22.117002	-9.1	-2.2
2	APR	1980	1600	93.665004	80.458618	-22.120687	-8.5	-2.3
2	APR	1980	1644	93.697227	80.458083	-22.130297	-7.1	-2.8
2	APR	1980	1700	93.708330	80.456116	-22.134251	-7.1	-2.8
2	APR	1980	1704	93.711113	80.455985	-22.135731	-5.9	-2.8
2	APR	1980	1723	93.727770	80.455315	-22.140276	-4.5	-1.8
2	APR	1980	1800	93.750000	80.454059	-22.141582	-3.3	1.0
2	APR	1980	1830	93.770830	80.454109	-22.135384	-3.7	3.6
2	APR	1980	1850	93.784721	80.453059	-22.127880	-4.0	3.0
2	APR	1980	1900	93.791004	80.453392	-22.123232	-5.2	5.5
2	APR	1980	2000	93.833330	80.451050	-22.086800	-9.3	7.7
2	APR	1980	2016	93.844444	80.450184	-22.078059	-10.5	7.7
2	APR	1980	2037	93.854032	80.448944	-22.062193	-11.5	7.3
2	APR	1980	2100	93.875000	80.447487	-22.048746	-11.7	5.0
2	APR	1980	2101	93.875000	80.447487	-22.048746	-11.7	5.0
2	APR	1980	2200	93.915004	80.443810	-22.024737	-10.9	4.3
2	APR	1980	2202	93.915004	80.443810	-22.024737	-10.9	4.3
2	APR	1980	2244	93.950000	80.441071	-22.003478	-10.2	5.6
2	APR	1980	2300	93.953330	80.440414	-21.997126	-10.0	5.3
2	APR	1980	2344	93.982303	80.437775	-21.988329	-10.2	5.8

## FRA 4 2 NAVIGATION - KALMAN

DY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
3	APR	1980	0	94.000000	80.437164	-21.961967	-10.4	6.6
3	APR	1980	35	94.024300	80.435188	-21.942602	-10.3	6.3
3	APR	1980	100	94.041664	80.433823	-21.928900	-9.8	6.4
3	APR	1980	158	94.081940	80.430992	-21.894011	-8.3	7.7
3	APR	1980	200	94.083336	80.430901	-21.892673	-8.3	7.7
3	APR	1980	221	94.097923	80.429985	-21.878004	-7.9	8.4
3	APR	1980	300	94.125000	80.426366	-21.848238	-7.5	9.1
3	APR	1980	400	94.160004	80.425696	-21.799598	-7.9	9.3
3	APR	1980	500	94.208336	80.423157	-21.753122	-9.0	8.5
3	APR	1980	600	94.250000	80.420044	-21.711363	-10.1	7.5
3	APR	1980	700	94.291664	80.416641	-21.674311	-10.8	6.8
3	APR	1980	800	94.333336	80.413139	-21.639946	-10.7	6.6
3	APR	1980	900	94.375000	80.409790	-21.605410	-9.9	6.9
3	APR	1980	929	94.395142	80.408287	-21.587645	-9.3	7.2
3	APR	1980	1000	94.416664	80.406784	-21.568174	-8.6	7.5
3	APR	1980	1100	94.458336	80.404213	-21.527239	-7.2	8.3
3	APR	1980	1200	94.500000	80.402077	-21.482655	-5.9	8.9
3	APR	1980	1300	94.541664	80.400322	-21.435436	-5.0	9.3
3	APR	1980	1400	94.563336	80.398827	-21.387274	-4.3	9.3
3	APR	1980	1500	94.625000	80.397461	-21.340115	-4.1	8.9
3	APR	1980	1600	94.660004	80.395116	-21.295704	-4.2	8.3
3	APR	1980	1615	94.677080	80.395782	-21.285183	-4.2	8.1
3	APR	1980	1700	94.703336	80.394745	-21.255152	-4.3	7.5
3	APR	1980	1800	94.750000	80.393364	-21.218567	-4.2	6.7
3	APR	1980	1900	94.791664	80.392052	-21.185303	-3.8	6.2
3	APR	1980	2000	94.833336	80.390915	-21.154301	-3.1	5.9
3	APR	1980	2100	94.875000	80.390068	-21.124529	-2.1	5.7
3	APR	1980	2134	94.8843613	80.389748	-21.107935	-1.5	5.7
3	APR	1980	2200	94.916664	80.389572	-21.095356	-1.0	5.6
3	APR	1980	2300	94.958336	80.389404	-21.066914	-0.1	5.4
3	APR	1980	2346	94.949273	80.389450	-21.046190	0.4	5.1
4	APR	1980	0	95.000000	80.389488	-21.040155	0.6	5.0
4	APR	1980	100	95.041664	80.389732	-21.016144	0.9	4.3
4	APR	1980	200	95.083336	80.390068	-20.996176	1.1	3.4
4	APR	1980	300	95.125000	80.390419	-20.981464	1.1	2.3
4	APR	1980	400	95.166664	80.390739	-20.972895	0.9	1.0
4	APR	1980	500	95.208336	80.390999	-20.970860	0.7	-0.2
4	APR	1980	600	95.250000	80.391182	-20.975151	0.4	-1.4
4	APR	1980	700	95.291664	80.391289	-20.984797	0.2	-2.3
4	APR	1980	800	95.333336	80.391314	-20.9947929	0.0	-2.7
4	APR	1980	839	95.369413	80.391266	-21.007087	-0.2	-2.7
4	APR	1980	900	95.375000	80.391273	-21.011932	-0.2	-2.9
4	APR	1980	1000	95.416664	80.391174	-21.024122	-0.4	-1.9
4	APR	1980	1100	95.458336	80.391022	-21.030626	-0.6	-0.5
4	APR	1980	1200	95.500000	80.390816	-21.027427	-0.7	1.3
4	APR	1980	1214	95.504727	80.390762	-21.026560	-0.7	1.3
4	APR	1980	1300	95.541664	80.390564	-21.017172	-0.9	2.9
4	APR	1980	1400	95.583336	80.390244	-20.999954	-1.1	3.5
4	APR	1980	1500	95.625000	80.389647	-20.983952	-1.4	2.5
4	APR	1980	1600	95.666664	80.389360	-20.976917	-1.6	0.1
4	APR	1980	1700	95.708336	80.388869	-20.984728	-1.8	-3.1
4	APR	1980	1800	95.750000	80.388222	-21.008715	-1.8	-6.0
4	APR	1980	1900	95.791664	80.387680	-21.043050	-1.5	-9.9
4	APR	1980	1932	95.813596	80.387451	-21.051119	-1.2	-5.2
4	APR	1980	2000	95.833336	80.387299	-21.071610	-0.8	-5.0
4	APR	1980	2046	95.853273	80.387177	-21.085543	-0.2	-1.9
4	APR	1980	2100	95.875000	80.387161	-21.099664	-0.1	-0.7
4	APR	1980	2200	95.916664	80.387135	-21.085630	-0.3	1.6
4	APR	1980	2205	95.920135	80.387123	-21.084861	-0.4	1.5
4	APR	1980	2257	95.956745	80.386969	-21.079454	-1.0	0.7
4	APR	1980	2300	95.958336	80.386894	-21.079277	-1.0	0.7
4	APR	1980	2325	95.975700	80.386749	-21.078485	-1.1	0.1
4	APR	1980	2352	95.994416	80.386581	-21.078503	-1.1	-0.1
5	APR	1980	0	96.000000	80.386530	-21.078583	-1.1	-0.1
5	APR	1980	20	96.013885	80.386424	-21.078889	-0.9	-0.2
5	APR	1980	44	96.030550	80.386322	-21.079455	-0.7	-0.4
5	APR	1980	100	96.041664	80.386280	-21.079692	-0.6	-0.4
5	APR	1980	200	96.083336	80.386135	-21.084032	-0.4	-1.3



# FRA 2 NAVIGATION - KALMAN

DAY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
0	APR	1980	207	96.088190	86.386124	-21.084896	-0.4	-1.5
0	APR	1980	230	96.104104	86.386070	-21.088530	-0.5	-2.2
0	APR	1980	257	96.122917	86.385994	-21.094460	-0.6	-3.0
0	APR	1980	300	96.125000	86.385979	-21.095230	-0.6	-3.0
0	APR	1980	354	96.152498	86.385811	-21.111151	-0.4	-3.5
0	APR	1980	400	96.165504	86.385796	-21.112925	-0.3	-3.4
0	APR	1980	416	96.177773	86.385788	-21.117422	0.0	-3.1
0	APR	1980	500	96.203336	86.385895	-21.126774	0.8	-1.6
0	APR	1980	511	96.215973	86.385948	-21.128090	1.0	-1.1
0	APR	1980	600	96.250000	86.386246	-21.130360	0.9	-0.5
0	APR	1980	629	96.270142	86.386337	-21.132395	0.2	-1.3
0	APR	1980	658	96.290276	86.386307	-21.137115	-0.5	-2.5
0	APR	1980	700	96.291664	86.386307	-21.137558	-0.5	-2.6
0	APR	1980	800	96.333336	86.386086	-21.152769	-0.4	-2.3
0	APR	1980	815	96.343750	86.386070	-21.155109	0.0	-1.4
0	APR	1980	846	96.365273	86.386116	-21.156818	0.4	-0.1
0	APR	1980	900	96.375000	86.386147	-21.156683	0.5	0.3
0	APR	1980	1000	96.410004	86.386284	-21.155228	0.2	-0.3
0	APR	1980	1100	96.453336	86.386292	-21.152106	0.0	-2.2
0	APR	1980	1124	96.474998	86.386292	-21.156986	0.1	-2.5
0	APR	1980	1200	96.500000	86.386322	-21.175616	0.2	-2.5
0	APR	1980	1220	96.513685	86.386345	-21.179098	0.2	-2.2
0	APR	1980	1300	96.541664	86.386398	-21.186249	0.3	-2.1
0	APR	1980	1312	96.549995	86.386421	-21.188467	0.3	-2.2
0	APR	1980	1331	96.563194	86.386458	-21.192291	0.5	-2.5
0	APR	1980	1400	96.583336	86.386551	-21.199131	0.7	-3.0
0	APR	1980	1500	96.625000	86.386909	-21.217001	1.5	-3.8
0	APR	1980	1500	96.625000	86.386909	-21.217001	1.5	-3.8
0	APR	1980	1515	96.635106	86.387047	-21.222345	1.7	-4.0
0	APR	1980	1554	96.662498	86.387428	-21.236385	1.9	-4.8
0	APR	1980	1600	96.665004	86.387489	-21.236880	1.8	-4.9
0	APR	1980	1624	96.683327	86.387711	-21.249676	1.5	-5.5
0	APR	1980	1647	96.699310	86.387856	-21.260891	0.6	-5.8
0	APR	1980	1700	96.703336	86.387901	-21.267394	0.4	-5.9
0	APR	1980	1701	96.703023	86.387901	-21.267902	0.4	-5.9
0	APR	1980	1740	96.735115	86.387901	-21.287441	-0.3	-5.7
0	APR	1980	1800	96.750000	86.387871	-21.297012	-0.2	-5.4
0	APR	1980	1810	96.755950	86.387871	-21.301111	-0.1	-5.3
0	APR	1980	1900	96.791004	86.387955	-21.324543	1.1	-5.9
0	APR	1980	1926	96.809723	86.388199	-21.331954	1.9	-7.1
0	APR	1980	2000	96.833336	86.388220	-21.362892	2.7	-4.3
0	APR	1980	2100	96.875000	86.389572	-21.417122	2.6	-10.5
0	APR	1980	2113	96.884020	86.389753	-21.428984	2.3	-10.1
0	APR	1980	2144	96.913336	86.390150	-21.454155	2.2	-9.3
0	APR	1980	2200	96.915004	86.390343	-21.484431	2.5	-9.7
0	APR	1980	2239	96.937682	86.390440	-21.486960	1.2	-4.3
0	APR	1980	2300	96.953336	86.390854	-21.489385	1.2	-4.3
0	APR	1980	2354	96.995827	86.391220	-21.513809	1.6	-9.0
0	APR	1980	0	97.000000	86.391273	-21.517365	1.8	-7.0
0	APR	1980	40	97.031944	86.391785	-21.548063	2.1	-8.0
0	APR	1980	100	97.051604	86.391937	-21.557598	2.0	-7.3
0	APR	1980	118	97.054109	86.392120	-21.569553	1.8	-7.7
0	APR	1980	140	97.079350	86.392342	-21.584021	1.9	-7.7
0	APR	1980	200	97.093336	86.392563	-21.597244	2.2	-7.8
0	APR	1980	300	97.125000	86.393532	-21.636951	3.4	-7.4
0	APR	1980	305	97.124471	86.393639	-21.640116	4.0	-7.3
0	APR	1980	327	97.133745	86.394150	-21.683504	4.7	-8.0
0	APR	1980	400	97.150004	86.395058	-21.722400	5.2	-8.8
0	APR	1980	419	97.179403	86.395588	-21.863200	5.1	-8.8
0	APR	1980	453	97.213408	86.396423	-21.704084	3.8	-7.5
0	APR	1980	500	97.204336	86.396581	-21.708624	3.5	-7.7
0	APR	1980	600	97.250000	86.397275	-21.750851	1.3	-8.4
0	APR	1980	606	97.253173	86.397324	-21.755234	1.2	-8.4
0	APR	1980	700	97.291504	86.397659	-21.793322	1.4	-7.4
0	APR	1980	754	97.323103	86.398143	-21.828900	2.7	-8.6
0	APR	1980	800	97.333336	86.398202	-21.830290	2.2	-8.5
0	APR	1980	828	97.352776	86.398013	-21.845095	2.3	-8.8
0	APR	1980	848	97.355004	86.398157	-21.854824	2.2	-8.5

## FPA4 2 NAVIGATION - A04A

DAY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
0	APR	1980	900	97.375000	80.398994	-21.860367	2.0	-5.3
0	APR	1980	941	97.403473	80.399391	-21.876143	1.6	-4.9
0	APR	1980	1000	97.416004	80.399551	-21.886095	1.4	-4.8
0	APR	1980	1100	97.458336	80.399918	-21.908498	0.8	-3.8
0	APR	1980	1128	97.477776	80.400002	-21.916954	0.4	-2.8
0	APR	1980	1200	97.500000	80.400032	-21.923540	-0.1	-2.0
0	APR	1980	1300	97.541554	80.399953	-21.934397	-0.1	-2.0
0	APR	1980	1349	97.575091	80.400009	-21.952551	0.6	-5.8
0	APR	1980	1400	97.583336	80.400047	-21.958435	0.8	-6.6
0	APR	1980	1500	97.625000	80.400490	-21.998936	1.9	-8.3
0	APR	1980	1536	97.650002	80.400925	-22.023764	2.4	-7.6
0	APR	1980	1600	97.666664	80.401253	-22.038506	2.6	-6.7
0	APR	1980	1648	97.700005	80.401976	-22.052904	2.9	-5.2
0	APR	1980	1700	97.708336	80.402153	-22.068077	2.9	-4.8
0	APR	1980	1722	97.723010	80.402512	-22.076796	3.0	-4.3
0	APR	1980	1800	97.750000	80.403152	-22.089493	3.2	-3.6
0	APR	1980	1835	97.774300	80.403740	-22.100361	2.9	-3.7
0	APR	1980	1900	97.791064	80.404099	-22.108597	2.4	-4.0
0	APR	1980	2000	97.833336	80.404648	-22.131113	1.0	-4.5
0	APR	1980	2021	97.847423	80.404724	-22.139233	0.5	-4.4
0	APR	1980	2055	97.871529	80.404779	-22.150574	0.1	-3.1
0	APR	1980	2100	97.875000	80.404776	-22.151827	0.1	-2.7
0	APR	1980	2200	97.915004	80.404936	-22.156794	1.2	0.7
0	APR	1980	2207	97.921532	80.404976	-22.156261	1.4	1.0
0	APR	1980	2300	97.954336	80.405571	-22.148615	2.4	1.7
0	APR	1980	2305	97.961000	80.405632	-22.147605	2.4	1.6
7	APR	1980	0	98.000000	80.406273	-22.145023	1.8	-0.7
7	APR	1980	29	98.020142	80.406509	-22.148857	1.2	-2.3
7	APR	1980	52	98.030119	80.406639	-22.154327	0.6	-3.2
7	APR	1980	100	98.041054	80.406670	-22.156584	0.3	-3.4
7	APR	1980	200	98.083336	80.406830	-22.176264	0.2	-3.8
7	APR	1980	216	98.094444	80.406845	-22.181381	0.1	-3.5
7	APR	1980	236	98.109718	80.406861	-22.187824	0.1	-3.2
7	APR	1980	300	98.125000	80.406843	-22.193331	0.3	-2.5
7	APR	1980	400	98.150004	80.407143	-22.203201	1.4	-1.3
7	APR	1980	500	98.204336	80.407768	-22.208595	2.3	-1.0
7	APR	1980	514	98.213055	80.407944	-22.209837	2.3	-1.1
7	APR	1980	600	98.250000	80.408405	-22.214067	1.4	-0.6
7	APR	1980	700	98.291054	80.408890	-22.217491	0.5	-0.4
7	APR	1980	791	98.292336	80.408897	-22.217524	0.5	-0.4
7	APR	1980	750	98.331040	80.408890	-22.220699	-0.2	-1.1
7	APR	1980	800	98.333336	80.408892	-22.220640	-0.2	-1.1
7	APR	1980	844	98.339704	80.408892	-22.220107	0.0	-1.0
7	APR	1980	900	98.375000	80.408895	-22.231972	0.5	-1.1
7	APR	1980	920	98.383039	80.408897	-22.233735	0.5	-0.8
7	APR	1980	960	98.400044	80.408901	-22.234437	0.6	-0.5
7	APR	1980	1000	98.417054	80.409142	-22.236055	0.6	0.5
7	APR	1980	1030	98.441073	80.409264	-22.236682	0.4	1.0
7	APR	1980	1100	98.454336	80.409294	-22.228748	0.0	2.1
7	APR	1980	1133	98.4441255	80.409296	-22.226593	-0.4	2.1
7	APR	1980	1200	98.500000	80.409180	-22.216266	-0.5	1.9
7	APR	1980	1300	98.541004	80.408997	-22.213137	-0.5	-0.4
7	APR	1980	1300	98.541004	80.408997	-22.213137	-0.5	-0.4
7	APR	1980	1321	98.555252	80.408935	-22.214512	-0.5	-1.0
7	APR	1980	1400	98.543336	80.408944	-22.215336	-0.5	-1.0
7	APR	1980	1500	98.525000	80.408900	-22.220827	-0.5	-0.1
7	APR	1980	1600	98.633336	80.408976	-22.220471	-0.5	0.7
7	APR	1980	1655	98.633337	80.408950	-22.221431	-0.3	-0.4
7	APR	1980	1700	98.633336	80.408950	-22.221431	-0.2	-0.4
7	APR	1980	1734	98.692777	80.408943	-22.225121	0.1	-1.2
7	APR	1980	1800	98.700000	80.408954	-22.226921	0.1	-0.5
7	APR	1980	1743	98.733190	80.408954	-22.227346	-0.2	0.3
7	APR	1980	1800	98.750000	80.408925	-22.228320	-0.3	0.4
7	APR	1980	1820	98.750000	80.408925	-22.228320	-0.5	0.4
7	APR	1980	1850	98.741000	80.408925	-22.228674	-0.4	0.1
7	APR	1980	2000	98.833336	80.408930	-22.225675	0.2	-0.3
7	APR	1980	2100	98.875000	80.408943	-22.226902	0.4	0.1

FRAM 2 NAVIGATION - KALMAN

DAY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
7	APR	1980	2115	98.885414	86.408493	-22.226641	-0.3	0.3
7	APR	1980	2200	98.916604	86.408516	-22.223755	-0.2	1.2
7	APR	1980	2300	98.953336	86.408302	-22.216942	-1.0	1.1
7	APR	1980	2302	98.959724	86.408295	-22.216763	-1.0	1.0
7	APR	1980	2333	98.981255	86.408119	-22.215136	-1.0	0.1
8	APR	1980	0	99.000000	86.407990	-22.215981	-0.8	-0.8
8	APR	1980	2	99.001396	86.407982	-22.216118	-0.8	-0.8
8	APR	1980	48	99.033333	86.407784	-22.220619	-1.1	-1.1
8	APR	1980	100	99.041664	86.407700	-22.221590	-1.4	-0.8
8	APR	1980	119	99.054863	86.407532	-22.222637	-1.8	-0.5
8	APR	1980	149	99.075691	86.407227	-22.223072	-1.8	0.1
8	APR	1980	200	99.083336	86.407127	-22.222862	-1.6	0.3
8	APR	1980	300	99.125000	86.406776	-22.219219	-0.6	0.9
8	APR	1980	305	99.128471	86.406761	-22.218834	-0.5	0.9
8	APR	1980	336	99.150002	86.406715	-22.216448	-0.1	0.8
8	APR	1980	400	99.166664	86.406715	-22.214687	0.0	0.4
8	APR	1980	422	99.181946	86.406715	-22.213522	0.0	0.2
8	APR	1980	451	99.202087	86.406685	-22.213255	-0.3	-0.4
8	APR	1980	500	99.208336	86.406662	-22.213507	-0.5	-0.9
8	APR	1980	600	99.250000	86.406403	-22.217726	-1.1	0.3
8	APR	1980	700	99.291664	86.406052	-22.219780	-0.9	1.5
8	APR	1980	756	99.330559	86.405930	-22.214853	0.1	1.5
8	APR	1980	800	99.333336	86.405930	-22.214338	0.2	0.5
8	APR	1980	850	99.372223	86.406097	-22.208347	0.7	0.3
8	APR	1980	900	99.375000	86.406113	-22.208704	0.0	-0.9
8	APR	1980	944	99.405556	86.406212	-22.209797	-0.4	-1.2
8	APR	1980	1000	99.416664	86.406197	-22.211248	-0.9	-1.5
8	APR	1980	1044	99.447227	86.406021	-22.216381	-0.8	-1.1
8	APR	1980	1100	99.458336	86.405952	-22.218433	-0.6	-0.4
8	APR	1980	1130	99.479164	86.405830	-22.221865	-0.5	0.1
8	APR	1980	1200	99.500000	86.405754	-22.223749	-0.8	0.3
8	APR	1980	1231	99.521523	86.405655	-22.224089	-1.3	0.7
8	APR	1980	1300	99.541664	86.405495	-22.223621	-0.9	0.8
8	APR	1980	1400	99.583336	86.405006	-22.219942	0.7	0.3
8	APR	1980	1419	99.595527	86.404892	-22.217592	1.9	-0.5
8	APR	1980	1500	99.625000	86.404846	-22.217804	2.3	-1.3
8	APR	1980	1524	99.641663	86.405014	-22.219456	3.4	-1.8
8	APR	1980	1545	99.655250	86.405281	-22.221443	3.6	-1.9
8	APR	1980	1600	99.665664	86.405540	-22.222404	1.4	-1.7
8	APR	1980	1606	99.670437	86.405647	-22.230389	0.9	-1.3
8	APR	1980	1651	99.702087	86.405441	-22.232800	-3.2	0.6
8	APR	1980	1700	99.733336	86.405013	-22.229664	-3.1	1.3
8	APR	1980	1800	99.750000	86.405342	-22.227584	-2.5	1.4
8	APR	1980	1837	99.775691	86.405006	-22.226919	-2.2	1.5
8	APR	1980	1854	99.787498	86.404724	-22.218882	0.4	1.3
8	APR	1980	1900	99.791664	86.404839	-22.216665	1.2	0.9
8	APR	1980	2000	99.833336	86.405151	-22.215311	1.8	0.1
8	APR	1980	2024	99.843998	86.405663	-22.216503	0.9	-0.2
8	APR	1980	2100	99.875000	86.405693	-22.216646	0.5	-0.1
8	APR	1980	2200	99.916664	86.405609	-22.215605	-1.0	0.7
8	APR	1980	2210	99.923615	86.405266	-22.211592	-0.9	0.5
8	APR	1980	2300	99.954336	86.405251	-22.211388	-0.8	0.5
8	APR	1980	2356	99.997223	86.405212	-22.210981	-0.5	0.3
9	APR	1980	0	100.000000	86.405258	-22.212088	0.0	-0.8
9	APR	1980	11	100.007637	86.405258	-22.212088	0.0	-0.8
9	APR	1980	100	100.041664	86.405602	-22.216884	0.0	-0.7
9	APR	1980	157	100.051245	86.405609	-22.217039	0.5	-0.6
9	APR	1980	200	100.053336	86.405540	-22.216940	-0.9	0.7
9	APR	1980	246	100.115273	86.405464	-22.215796	-1.1	1.2
9	APR	1980	300	100.125000	86.405037	-22.206688	-1.4	2.0
9	APR	1980	400	100.166664	86.404610	-22.198612	-1.3	0.9
9	APR	1980	500	100.208336	86.404445	-22.197724	-1.2	0.3
9	APR	1980	517	100.220140	86.404235	-22.198515	-0.9	-0.6
9	APR	1980	600	100.250000	86.404083	-22.202135	0.1	-0.5
9	APR	1980	700	100.294441	86.404091	-22.202288	0.2	-0.4
9	APR	1980	704	100.333336	86.404236	-22.203347	0.5	-0.3

## FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
9	APR	1980	807	100.338195	86.404251	-22.203564	0.4	-0.4
9	APR	1980	851	100.368752	86.404289	-22.206253	-0.1	-1.0
9	APR	1980	900	100.375000	86.404282	-22.207037	-0.2	-1.1
9	APR	1980	954	100.412498	86.404175	-22.211905	-0.5	-0.8
9	APR	1980	1000	100.416664	86.404160	-22.212263	-0.55	-0.6
9	APR	1980	1038	100.443054	86.404053	-22.212736	-0.5	0.4
9	APR	1980	1100	100.458336	86.403984	-22.211189	-0.5	1.2
9	APR	1980	1142	100.487495	86.403870	-22.205074	-0.6	2.0
9	APR	1980	1200	100.500000	86.403809	-22.202003	-0.7	2.0
9	APR	1980	1300	100.541664	86.403564	-22.195181	-0.8	0.2
9	APR	1980	1310	100.548615	86.403519	-22.195230	-0.8	-0.3
9	APR	1980	1330	100.562500	86.403435	-22.196575	-0.8	-1.2
9	APR	1980	1400	100.583336	86.403320	-22.200705	-0.7	-1.9
9	APR	1980	1500	100.625000	86.403160	-22.209599	-0.3	-1.2
9	APR	1980	1600	100.666664	86.403145	-22.211620	0.2	0.2
9	APR	1980	1643	100.696526	86.403214	-22.209921	0.3	0.6
9	APR	1980	1700	100.708336	86.403244	-22.209085	0.3	0.6
9	APR	1980	1800	100.750000	86.403305	-22.206905	-0.1	0.2
9	APR	1980	1900	100.791664	86.403145	-22.207001	-0.9	-0.1
9	APR	1980	1932	100.813896	86.402977	-22.207031	-1.1	0.1
9	APR	1980	2000	100.833336	86.402817	-22.206306	-1.0	0.5
9	APR	1980	2016	100.844444	86.402740	-22.205433	-0.8	0.8
9	APR	1980	2038	100.859718	86.402657	-22.203793	-0.6	0.9
9	APR	1980	2100	100.875000	86.402611	-22.202093	-0.3	0.8
9	APR	1980	2200	100.916664	86.402580	-22.199680	-0.1	0.0
9	APR	1980	2225	100.934029	86.402565	-22.200031	-0.2	-0.3
9	APR	1980	2300	100.958336	86.402504	-22.201448	-0.3	-0.5
10	APR	1980	0	101.000000	86.402451	-22.203672	0.2	-0.2
10	APR	1980	12	101.008331	86.402473	-22.203791	0.4	0.0
10	APR	1980	100	101.041664	86.402626	-22.203583	0.6	0.0
10	APR	1980	137	101.067350	86.402695	-22.204504	0.0	-0.6
10	APR	1980	158	101.081940	86.402664	-22.205782	-0.5	-0.8
10	APR	1980	200	101.083336	86.402657	-22.205929	-0.6	-0.9
10	APR	1980	300	101.125000	86.402306	-22.211069	-1.4	-0.9
10	APR	1980	325	101.142365	86.402107	-22.212700	-1.4	-0.6
10	APR	1980	344	101.155556	86.401970	-22.213474	-1.3	-0.3
10	APR	1980	400	101.166664	86.401855	-22.213783	-1.2	-0.1
10	APR	1980	422	101.181940	86.401726	-22.213705	-1.0	0.2
10	APR	1980	500	101.208336	86.401550	-22.212513	-0.7	0.5
10	APR	1980	600	101.250000	86.401382	-22.209520	-0.4	0.5
10	APR	1980	700	101.291664	86.401230	-22.207092	-0.6	0.3
10	APR	1980	800	101.333336	86.400993	-22.206123	-0.9	0.0
10	APR	1980	900	101.375000	86.400888	-22.207170	-0.9	-0.5
10	APR	1980	906	101.379173	86.400653	-22.207430	-0.9	-0.5
10	APR	1980	1000	101.416664	86.400475	-22.211460	-0.2	-1.2
10	APR	1980	1053	101.453408	86.400551	-22.217705	0.7	-1.3
10	APR	1980	1160	101.458336	86.400574	-22.218430	0.8	-1.2
10	APR	1980	1134	101.481941	86.400734	-22.220670	0.9	-0.3
10	APR	1980	1200	101.500000	86.400848	-22.220201	0.7	0.7
10	APR	1980	1240	101.527779	86.400917	-22.216347	0.0	1.3
10	APR	1980	1300	101.541664	86.400894	-22.214180	-0.4	1.2
10	APR	1980	1400	101.583336	86.400696	-22.211544	-0.5	-0.4
10	APR	1980	1408	101.588890	86.400673	-22.211926	-0.4	-0.7
10	APR	1980	1426	101.602776	86.400650	-22.213724	-0.1	-1.3
10	APR	1980	1500	101.625000	86.400681	-22.217941	0.4	-1.5
10	APR	1980	1600	101.658336	86.400871	-22.222429	0.4	0.2
10	APR	1980	1615	101.677086	86.400894	-22.221760	0.2	0.9
10	APR	1980	1654	101.704153	86.400871	-22.217266	-0.3	1.5
10	APR	1980	1700	101.708336	86.400864	-22.216516	-0.3	1.4
10	APR	1980	1741	101.738899	86.400772	-22.212864	-0.4	0.5
10	APR	1980	1800	101.750000	86.400734	-22.212511	-0.4	-0.1
10	APR	1980	1840	101.777779	86.400658	-22.214481	-0.4	-0.9
10	APR	1980	1900	101.791664	86.400612	-22.216200	-0.4	-1.0
10	APR	1980	1928	101.811104	86.400543	-22.218672	-0.5	-0.9
10	APR	1980	2000	101.833336	86.400459	-22.220398	-0.4	-0.4
10	APR	1980	2026	101.851387	86.400406	-22.220577	-0.3	0.2
10	APR	1980	2100	101.875000	86.400368	-22.218060	0.0	0.9
10	APR	1980	2114	101.884727	86.400375	-22.217758	0.1	1.1

FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULIANT	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
10	APR	1980	2136	101.9000002	86.4004066	-22.215466	0.4	1.3
10	APR	1980	2200	101.9166664	86.400459	-22.213037	0.5	1.1
10	APR	1980	2213	101.9250090	86.400497	-22.211969	0.5	0.9
10	APR	1980	2300	101.9583336	86.400597	-22.210426	0.3	-0.2
10	APR	1980	2322	101.973610	86.400627	-22.211334	0.2	-0.8
10	APR	1980	2359	101.999306	86.400635	-22.214598	-0.2	-1.1
11	APR	1980	0	102.0000000	86.400635	-22.214695	-0.2	-1.1
11	APR	1980	100	102.0416664	86.400520	-22.219854	-0.2	-0.8
11	APR	1980	109	102.047913	86.400513	-22.220478	-0.1	-0.8
11	APR	1980	200	102.0833336	86.400551	-22.223080	0.3	-0.4
11	APR	1980	256	102.122223	86.400620	-22.223209	-0.1	0.4
11	APR	1980	300	102.125000	86.400612	-22.223055	-0.2	0.5
11	APR	1980	400	102.1666664	86.400475	-22.217949	-0.4	1.4
11	APR	1980	423	102.182640	86.400436	-22.214862	-0.2	1.7
11	APR	1980	500	102.2083336	86.400436	-22.208830	0.2	2.1
11	APR	1980	500	102.2083336	86.400436	-22.208830	0.2	2.1
11	APR	1980	520	102.222221	86.400467	-22.205011	0.4	2.3
11	APR	1980	600	102.250000	86.400581	-22.197079	0.6	2.2
11	APR	1980	700	102.291664	86.400795	-22.189867	0.7	0.3
11	APR	1980	800	102.3333336	86.400970	-22.194321	0.3	-1.8
11	APR	1980	816	102.344444	86.400993	-22.197035	0.1	-2.1
11	APR	1980	854	102.370827	86.400955	-22.204340	-0.5	-2.1
11	APR	1980	900	102.375000	86.400940	-22.205399	-0.6	-2.0
11	APR	1980	1000	102.4156664	86.400650	-22.213257	-1.0	-1.2
11	APR	1980	1004	102.419441	86.400627	-22.213652	-1.0	-1.1
11	APR	1980	1042	102.445831	86.400459	-22.216822	-0.6	-0.8
11	APR	1980	1100	102.4583336	86.400406	-22.217892	-0.4	-0.6
11	APR	1980	1151	102.493752	86.400375	-22.220341	0.1	-0.7
11	APR	1980	1200	102.500000	86.400383	-22.220936	0.2	-0.8
11	APR	1980	1300	102.5416664	86.400490	-22.226128	0.3	-0.9
11	APR	1980	1400	102.5833336	86.400467	-22.227636	-0.5	0.7
11	APR	1980	1500	102.625000	86.400223	-22.218952	-0.8	2.4
11	APR	1980	1526	102.643059	86.400124	-22.213348	-0.6	2.5
11	APR	1980	1600	102.6666664	86.400085	-22.207666	0.3	1.5
11	APR	1980	1602	102.668000	86.400093	-22.206812	0.4	1.4
11	APR	1980	1652	102.702782	86.400360	-22.205482	1.4	-0.6
11	APR	1980	1700	102.7083336	86.400421	-22.206001	1.4	-0.9
11	APR	1980	1748	102.711669	86.400726	-22.211510	0.5	-1.5
11	APR	1980	1800	102.750000	86.400742	-22.213100	0.0	-1.5
11	APR	1980	1839	102.777077	86.400566	-22.217918	-1.5	-1.3
11	APR	1980	1900	102.7916664	86.400360	-22.220666	-2.1	-1.1
11	APR	1980	2000	102.8333336	86.399536	-22.223684	-2.7	-0.3
11	APR	1980	2100	102.875000	86.398766	-22.222652	-1.9	0.7
11	APR	1980	2200	102.9166664	86.398346	-22.217234	-0.6	1.4
11	APR	1980	2300	102.9583336	86.398376	-22.209021	0.7	1.7
12	APR	1980	0	103.0000000	86.398781	-22.200346	1.7	1.6
12	APR	1980	100	103.0416664	86.399391	-22.193651	2.0	1.0
12	APR	1980	200	103.0833336	86.400002	-22.190877	1.7	0.1
12	APR	1980	300	103.1250000	86.400421	-22.192936	0.9	-0.8
12	APR	1980	400	103.1666664	86.400558	-22.198914	0.0	-1.4
12	APR	1980	426	103.186104	86.400528	-22.202322	-0.4	-1.4
12	APR	1980	500	103.2083336	86.400436	-22.206209	-0.7	-1.4
12	APR	1980	600	103.2500000	86.400200	-22.211746	-0.6	-0.7
12	APR	1980	614	103.259727	86.400154	-22.212410	-0.5	-0.4
12	APR	1980	700	103.2916664	86.400101	-22.212978	0.1	0.0
12	APR	1980	800	103.3333336	86.400253	-22.213583	0.8	-0.5
12	APR	1980	802	103.334724	86.400261	-22.213682	0.8	-0.6
12	APR	1980	900	103.3750000	86.400581	-22.219494	1.1	-1.7
12	APR	1980	1000	103.4166664	86.400687	-22.229303	0.6	-1.8
12	APR	1980	1100	103.4583336	86.400970	-22.235472	-0.2	-0.3
12	APR	1980	1136	103.433337	86.400902	-22.234106	-0.5	1.2
12	APR	1980	1200	103.5000000	86.400826	-22.230574	-0.6	2.2
12	APR	1980	1249	103.534027	86.400696	-22.217756	-0.2	3.6
12	APR	1980	1300	103.5416664	86.400688	-22.214226	0.0	3.8
12	APR	1980	1400	103.5833336	86.400818	-22.196369	0.7	2.3
12	APR	1980	1500	103.6250000	86.401039	-22.193827	0.5	-1.3
12	APR	1980	1510	103.631950	86.401062	-22.195185	0.3	-1.9
12	APR	1980	1600	103.6666664	86.401070	-22.205261	-0.3	-1.9

## FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
12	APR	1980	1604	103.659441	86.401062	-22.205896	-0.4	-1.7
12	APR	1980	1624	103.683327	86.401009	-22.207993	-0.6	-0.7
12	APR	1980	1656	103.705559	86.400879	-22.207970	-0.9	0.5
12	APR	1980	1700	103.708336	86.400864	-22.207769	-0.9	0.6
12	APR	1980	1800	103.750000	86.400581	-22.203846	-0.7	0.4
12	APR	1980	1843	103.779854	86.400467	-22.204683	-0.2	-0.8
12	APR	1980	1900	103.791064	86.400459	-22.206217	0.0	-1.3
12	APR	1980	2000	103.833336	86.400475	-22.215599	0.0	-2.1
12	APR	1980	2029	103.853477	86.400459	-22.220722	-0.3	-1.9
12	APR	1980	2100	103.875000	86.400398	-22.224651	-0.4	-0.9
12	APR	1980	2124	103.891663	86.400337	-22.225193	-0.4	0.4
12	APR	1980	2200	103.916664	86.400276	-22.221243	-0.2	2.0
12	APR	1980	2215	103.927086	86.400269	-22.218449	0.0	2.3
12	APR	1980	2300	103.958336	86.400322	-22.210714	0.3	0.9
12	APR	1980	2331	103.979858	86.400383	-22.211714	0.3	-1.7
13	APR	1980	0	104.000000	86.400406	-22.218863	0.1	-3.8
13	APR	1980	2	104.001396	86.400406	-22.219538	0.1	-4.0
13	APR	1980	100	104.041664	86.400368	-22.242111	-0.3	-4.1
13	APR	1980	200	104.083336	86.400215	-22.253700	-0.6	-0.2
13	APR	1980	300	104.125000	86.400032	-22.244450	-0.5	3.4
13	APR	1980	400	104.166664	86.399918	-22.222639	-0.1	4.5
13	APR	1980	500	104.208336	86.399986	-22.203449	0.6	2.6
13	APR	1980	522	104.223610	86.400078	-22.199727	0.9	1.4
13	APR	1980	600	104.250000	86.400330	-22.198515	1.5	-0.6
13	APR	1980	700	104.291664	86.400879	-22.206770	1.6	-2.1
13	APR	1980	710	104.298615	86.400963	-22.208588	1.5	-2.1
13	APR	1980	800	104.333336	86.401207	-22.216167	0.0	-1.1
13	APR	1980	825	104.359700	86.401123	-22.217480	-1.2	-0.1
13	APR	1980	857	104.372917	86.400826	-22.216482	-2.0	0.7
13	APR	1980	900	104.375000	86.400795	-22.216288	-2.0	0.8
13	APR	1980	1000	104.416664	86.400238	-22.211554	-0.9	0.7
13	APR	1980	1012	104.424995	86.400192	-22.210964	-0.4	0.5
13	APR	1980	1044	104.447227	86.400215	-22.210201	0.7	0.2
13	APR	1980	1100	104.458336	86.400291	-22.209902	1.1	0.2
13	APR	1980	1200	104.500000	86.400711	-22.208525	1.0	0.2
13	APR	1980	1200	104.500000	86.400711	-22.208525	1.0	0.2
13	APR	1980	1300	104.541664	86.400772	-22.208284	-0.6	-0.1
13	APR	1980	1400	104.583336	86.400429	-22.208563	-1.2	0.1
13	APR	1980	1500	104.625000	86.400169	-22.207233	-0.2	0.3
13	APR	1980	1503	104.627083	86.400169	-22.207153	-0.1	0.3
13	APR	1980	1600	104.666664	86.400284	-22.207161	0.7	-0.6
13	APR	1980	1604	104.669441	86.400299	-22.207376	0.7	-0.7
13	APR	1980	1648	104.700005	86.400475	-22.211415	0.5	-1.2
13	APR	1980	1700	104.708336	86.400505	-22.212679	0.5	-1.2
13	APR	1980	1751	104.743752	86.400551	-22.216942	-0.2	-0.5
13	APR	1980	1800	104.750000	86.400536	-22.217354	-0.4	-0.4
13	APR	1980	1833	104.772919	86.400436	-22.217625	-0.7	0.3
13	APR	1980	1900	104.791664	86.400330	-22.216351	-0.8	0.3
13	APR	1980	1937	104.817360	86.400192	-22.213724	-0.5	0.7
13	APR	1980	2000	104.833336	86.400146	-22.212772	-0.2	0.2
13	APR	1980	2100	104.875000	86.400185	-22.213671	0.4	-0.4
13	APR	1980	2124	104.891663	86.400246	-22.214338	0.5	-0.3
13	APR	1980	2200	104.916664	86.400368	-22.214569	0.7	0.2
13	APR	1980	2242	104.945831	86.400543	-22.212639	0.8	0.9
13	APR	1980	2300	104.958336	86.400620	-22.210896	0.9	1.3
13	APR	1980	2310	104.955279	86.400673	-22.209675	0.9	1.5
13	APR	1980	2350	104.993050	86.400841	-22.204113	0.6	1.4
14	APR	1980	0	105.000000	86.400864	-22.202958	0.4	1.2
14	APR	1980	100	105.041664	86.400879	-22.200874	-0.3	-0.4
14	APR	1980	136	105.066673	86.400803	-22.203224	-0.5	-1.0
14	APR	1980	200	105.083336	86.400734	-22.205578	-0.5	-1.2
14	APR	1980	300	105.125000	86.400558	-22.211346	-0.5	-0.8
14	APR	1980	322	105.140282	86.400490	-22.212496	-0.5	-0.4
14	APR	1980	400	105.166664	86.400375	-22.212870	-0.5	0.1
14	APR	1980	402	105.168000	86.400366	-22.212851	-0.5	0.1
14	APR	1980	430	105.187500	86.400314	-22.212400	-0.2	0.2
14	APR	1980	500	105.208336	86.400307	-22.212400	0.1	-0.2
14	APR	1980	508	105.213890	86.400314	-22.212559	0.2	-0.3

FRA 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
14	APR	1980	600	105.259000	86.400429	-22.214584	0.6	-0.5
14	APR	1980	617	105.261810	86.400482	-22.215181	0.6	-0.3
14	APR	1980	654	105.287498	86.400566	-22.215408	0.2	0.3
14	APR	1980	700	105.291664	86.400574	-22.215214	0.1	0.5
14	APR	1980	800	105.333336	86.400467	-22.211145	-0.5	0.7
14	APR	1980	804	105.335113	86.400452	-22.210920	-0.5	0.6
14	APR	1980	900	105.375000	86.400337	-22.210541	-0.1	-0.5
14	APR	1980	952	105.411110	86.400414	-22.214069	0.6	-0.9
14	APR	1980	1000	105.416664	86.400444	-22.214657	0.7	-0.8
14	APR	1980	1100	105.458336	86.400688	-22.216959	0.6	0.1
14	APR	1980	1110	105.465279	86.400719	-22.216724	0.6	0.4
14	APR	1980	1139	105.485413	86.400772	-22.214945	0.2	1.0
14	APR	1980	1200	105.500000	86.400780	-22.213051	0.0	1.1
14	APR	1980	1210	105.506950	86.400780	-22.212158	-0.1	1.0
14	APR	1980	1258	105.540276	86.400734	-22.208847	-0.2	0.6
14	APR	1980	1300	105.541664	86.400726	-22.208755	-0.2	0.5
14	APR	1980	1400	105.583336	86.400673	-22.206930	-0.1	0.3
14	APR	1980	1445	105.614586	86.400681	-22.205772	0.1	0.1
14	APR	1980	1500	105.625000	86.400696	-22.205845	0.2	-0.2
14	APR	1980	1512	105.633331	86.400703	-22.206200	0.2	-0.5
14	APR	1980	1540	105.652779	86.400734	-22.208029	0.1	-1.0
14	APR	1980	1600	105.666664	86.400742	-22.209858	0.0	-1.1
14	APR	1980	1632	105.683896	86.400711	-22.212627	-0.4	-0.8
14	APR	1980	1659	105.707642	86.400627	-22.214001	-0.7	-0.4
14	APR	1980	1700	105.708336	86.400627	-22.214033	-0.7	-0.4
14	APR	1980	1726	105.726387	86.400505	-22.214777	-0.9	-0.3
14	APR	1980	1800	105.750000	86.400345	-22.216032	-0.8	-0.6
14	APR	1980	1845	105.731250	86.400215	-22.219618	-0.2	-1.1
14	APR	1980	1900	105.731664	86.400215	-22.221090	0.1	-1.1
14	APR	1980	1911	105.739309	86.400223	-22.222153	0.3	-1.1
14	APR	1980	1946	105.823608	86.400330	-22.224825	0.9	-0.6
14	APR	1980	2000	105.833336	86.400406	-22.225288	1.0	-0.2
14	APR	1980	2032	105.855560	86.400604	-22.225109	1.2	0.2
14	APR	1980	2100	105.875000	86.400780	-22.224611	1.1	0.1
14	APR	1980	2153	105.911804	86.401031	-22.226173	0.6	-0.9
14	APR	1980	2200	105.915664	86.401054	-22.226759	0.5	-1.1
14	APR	1980	2218	105.929169	86.401093	-22.228689	0.3	-1.4
14	APR	1980	2300	105.958336	86.401100	-22.234549	-0.2	-1.7
14	APR	1980	2340	105.985115	86.401024	-22.240837	-0.4	-2.1
15	APR	1980	0	105.000000	86.400986	-22.244900	-0.3	-2.7
15	APR	1980	4	105.002777	86.400986	-22.245848	-0.2	-2.8
15	APR	1980	28	105.019440	86.400986	-22.252871	0.4	-4.1
15	APR	1980	100	105.041664	86.401159	-22.257834	1.9	-6.9
15	APR	1980	126	105.059723	86.401535	-22.263301	3.3	-9.6
15	APR	1980	200	105.093336	86.402237	-22.318747	4.0	-12.4
15	APR	1980	214	105.093950	86.402542	-22.334171	3.9	-13.2
15	APR	1980	300	105.125000	86.403519	-22.386387	4.4	-12.0
15	APR	1980	312	105.133331	86.403824	-22.398146	4.9	-10.7
15	APR	1980	400	105.166664	86.405235	-22.434404	5.6	-7.4
15	APR	1980	400	105.166664	86.405235	-22.434464	5.6	-7.4
15	APR	1980	500	105.208336	86.406921	-22.472776	4.7	-8.5
15	APR	1980	525	105.225700	86.407532	-22.493097	4.4	-10.4
15	APR	1980	546	105.230273	86.408020	-22.513271	4.1	-11.9
15	APR	1980	600	105.250000	86.408318	-22.528286	3.8	-12.9
15	APR	1980	700	105.291664	86.409248	-22.601955	1.6	-14.7
15	APR	1980	712	105.293955	86.409332	-22.617052	1.0	-14.5
15	APR	1980	800	105.333336	86.409401	-22.678416	0.1	-14.2
15	APR	1980	834	105.350941	86.409508	-22.718346	1.2	-14.5
15	APR	1980	900	105.375000	86.409737	-22.751553	2.1	-15.1
15	APR	1980	900	105.375000	86.409737	-22.751553	2.1	-15.1
15	APR	1980	1000	105.415664	86.410583	-22.831777	2.8	-15.4
15	APR	1980	1021	105.431252	86.410904	-22.859179	2.7	-14.8
15	APR	1980	1100	105.458336	86.411130	-22.907064	2.3	-13.5
15	APR	1980	1200	105.500000	86.412056	-22.972408	1.5	-11.9
15	APR	1980	1208	105.505554	86.412125	-22.980564	1.4	-11.7
15	APR	1980	1300	105.541664	86.412422	-23.031562	0.9	-11.1
15	APR	1980	1356	105.540559	86.412674	-23.083357	0.8	-10.3
15	APR	1980	1400	105.583336	86.412689	-23.086891	0.8	-10.2



## FRAM 2 NAVIGATION - KALMAN

DAY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
15	APR	1980	1500	106.625000	86.412827	-23.135963	-0.2	-8.6
15	APR	1980	1543	106.654854	86.412682	-23.166128	-1.0	-7.8
15	APR	1980	1600	106.666666	86.412582	-23.177668	-1.1	-7.9
15	APR	1980	1607	106.671532	86.412537	-23.182457	-1.1	-8.0
15	APR	1980	1700	106.708336	86.412308	-23.222267	-0.2	-9.9
15	APR	1980	1754	106.745827	86.412476	-23.275663	1.2	-12.7
15	APR	1980	1800	106.750000	86.412514	-23.282318	1.3	-12.9
15	APR	1980	1900	106.791604	86.413033	-23.349440	1.6	-11.8
15	APR	1980	2000	106.833336	86.413429	-23.397455	0.8	-6.3
15	APR	1980	2044	106.863892	86.413528	-23.414959	0.1	-3.5
15	APR	1980	2100	106.875000	86.413528	-23.419691	-0.1	-3.4
15	APR	1980	2104	106.877777	86.413528	-23.420860	-0.1	-3.4
15	APR	1980	2200	106.916654	86.413460	-23.444056	-0.3	-7.5
15	APR	1980	2250	106.951385	86.413383	-23.488789	-0.4	-12.6
15	APR	1980	2300	106.958336	86.413361	-23.499920	-0.4	-13.2
15	APR	1980	2312	106.966667	86.413330	-23.513874	-0.5	-13.7
16	APR	1980	0	107.000000	86.413177	-23.556967	-0.5	-11.8
16	APR	1980	37	107.025696	86.413124	-23.599358	0.1	-6.4
16	APR	1980	100	107.041664	86.413162	-23.608328	0.6	-2.6
16	APR	1980	200	107.083336	86.413475	-23.603456	1.1	3.0
16	APR	1980	224	107.099998	86.413605	-23.596779	0.9	3.3
16	APR	1980	300	107.125000	86.413750	-23.587269	-0.5	2.6
16	APR	1980	400	107.166664	86.413803	-23.579756	-0.1	0.2
16	APR	1980	500	107.203336	86.413765	-23.584164	0.0	-1.5
16	APR	1980	600	107.250000	86.413864	-23.591524	0.7	-1.1
16	APR	1980	620	107.253885	86.413948	-23.592989	0.9	-0.6
16	APR	1980	700	107.291664	86.414185	-23.594116	1.2	-0.1
16	APR	1980	744	107.322227	86.414444	-23.594961	0.9	-0.5
16	APR	1980	800	107.333336	86.414513	-23.595810	0.7	-0.8
16	APR	1980	900	107.375000	86.414635	-23.601557	0.2	-1.2
16	APR	1980	932	107.397224	86.414658	-23.604641	0.1	-1.0
16	APR	1980	1000	107.416664	86.414673	-23.606520	0.1	-0.6
16	APR	1980	1100	107.453336	86.414719	-23.607473	0.1	0.1
16	APR	1980	1200	107.500000	86.414734	-23.606148	-0.1	0.2
16	APR	1980	1300	107.541664	86.414642	-23.606594	-0.5	-0.4
16	APR	1980	1306	107.545037	86.414619	-23.606840	-0.6	-0.5
16	APR	1980	1400	107.583336	86.414421	-23.610352	-0.7	-0.9
16	APR	1980	1454	107.621827	86.414253	-23.613913	-0.4	-0.6
16	APR	1980	1500	107.625000	86.414238	-23.614201	-0.3	-0.5
16	APR	1980	1511	107.632037	86.414223	-23.614647	-0.2	-0.4
16	APR	1980	1600	107.666664	86.414200	-23.614737	0.0	0.5
16	APR	1980	1641	107.695137	86.414223	-23.611141	0.2	1.1
16	APR	1980	1700	107.708336	86.414253	-23.608477	0.4	1.5
16	APR	1980	1702	107.709724	86.414253	-23.608477	0.4	1.5
16	APR	1980	1800	107.750000	86.414430	-23.603338	0.7	0.1
16	APR	1980	1848	107.783336	86.414581	-23.607140	0.3	-1.8
16	APR	1980	1900	107.791604	86.414597	-23.609137	0.1	-2.1
16	APR	1980	2000	107.833336	86.414520	-23.622122	-0.3	-2.5
16	APR	1980	2034	107.855555	86.414497	-23.628828	0.0	-2.0
16	APR	1980	2100	107.875000	86.414520	-23.632721	0.2	-1.5
16	APR	1980	2200	107.916664	86.414558	-23.637718	-0.3	-0.6
16	APR	1980	2220	107.930550	86.414490	-23.638588	-0.9	-0.4
16	APR	1980	2300	107.958336	86.414192	-23.639975	-1.8	-0.4
16	APR	1980	2348	107.991669	86.413620	-23.641693	-2.5	-0.2
17	APR	1980	0	108.000000	86.413452	-23.641844	-2.6	-0.1
17	APR	1980	7	108.004860	86.413353	-23.641842	-2.7	0.1
17	APR	1980	100	108.041664	86.412521	-23.638161	-3.1	1.3
17	APR	1980	200	108.083336	86.411522	-23.624302	-2.6	3.2
17	APR	1980	300	108.125000	86.410828	-23.610529	-1.3	1.6
17	APR	1980	340	108.152779	86.410690	-23.596902	0.0	-0.7
17	APR	1980	400	108.166664	86.410721	-23.611134	0.5	-1.9
17	APR	1980	500	108.208336	86.410965	-23.620390	0.6	-3.4
17	APR	1980	528	108.227776	86.411003	-23.634096	-0.1	-3.0
17	APR	1980	600	108.250000	86.410904	-23.641176	-1.0	-2.1
17	APR	1980	700	108.291664	86.410461	-23.647760	-1.5	-0.5
17	APR	1980	715	108.302986	86.410347	-23.648199	-1.3	-0.2
17	APR	1980	800	108.333336	86.410049	-23.647863	-1.2	0.1
17	APR	1980	900	108.375000	86.409554	-23.649544	-2.1	-1.1



# FRAM 2 NAVIGATION - KALMAR

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
17	APR	1980	902	108.376396	86.409531	-23.649780	-2.2	-1.2
17	APR	1980	1000	108.416664	86.408577	-23.659199	-3.9	-2.3
17	APR	1980	1049	108.450091	86.407417	-23.667833	-4.7	-1.5
17	APR	1980	1100	108.458336	86.407135	-23.669119	-4.8	-1.2
17	APR	1980	1200	108.500000	86.405540	-23.669420	-4.8	-1.2
17	APR	1980	1300	108.541664	86.404091	-23.657177	-4.0	3.4
17	APR	1980	1400	108.583336	86.402969	-23.636736	-2.9	4.2
17	APR	1980	1500	108.625000	86.402206	-23.616169	-1.9	3.5
17	APR	1980	1600	108.666664	86.401680	-23.602116	-1.5	1.9
17	APR	1980	1610	108.673015	86.401596	-23.600580	-1.5	1.6
17	APR	1980	1700	108.708336	86.401138	-23.595646	-2.0	0.8
17	APR	1980	1756	108.747223	86.400391	-23.591320	-3.1	1.2
17	APR	1980	1800	108.750000	86.400322	-23.590891	-3.1	1.3
17	APR	1980	1900	108.791664	86.399101	-23.581358	-4.3	2.4
17	APR	1980	1942	108.820831	86.398079	-23.571608	-4.7	3.0
17	APR	1980	2000	108.833336	86.397614	-23.566807	-4.8	3.2
17	APR	1980	2100	108.875000	86.395988	-23.548395	-5.2	3.9
17	APR	1980	2128	108.894440	86.395195	-23.538762	-5.4	4.1
17	APR	1980	2200	108.916664	86.394241	-23.527365	-5.7	4.0
17	APR	1980	2300	108.958336	86.392235	-23.511559	-6.8	1.4
17	APR	1980	2315	108.968750	86.391670	-23.510431	-7.2	0.3
18	APR	1980	0	109.000000	86.389755	-23.516335	-8.5	-3.4
18	APR	1980	100	109.041664	86.386681	-23.545736	-10.5	-7.7
18	APR	1980	200	109.083336	86.382980	-23.592167	-12.3	-9.8
18	APR	1980	300	109.125000	86.378716	-23.642408	-13.9	-9.3
18	APR	1980	400	109.166664	86.374016	-23.685904	-15.0	-7.6
18	APR	1980	435	109.190971	86.371117	-23.707357	-15.5	-6.8
18	APR	1980	500	109.208336	86.368996	-23.721731	-15.9	-6.7
18	APR	1980	600	109.250000	86.363701	-23.758825	-16.8	-3.4
18	APR	1980	622	109.265282	86.361679	-23.775642	-17.2	-9.5
18	APR	1980	700	109.291664	86.358055	-23.808401	-18.1	-10.4
18	APR	1980	753	109.328468	86.352631	-23.852421	-19.7	-8.8
18	APR	1980	800	109.333336	86.351863	-23.857534	-19.9	-8.4
18	APR	1980	810	109.340279	86.350800	-23.864470	-20.2	-7.9
18	APR	1980	900	109.375000	86.345108	-23.896662	-22.1	-6.1
18	APR	1980	940	109.402179	86.340149	-23.928467	-23.8	-10.9
18	APR	1980	957	109.414581	86.337936	-23.945276	-24.4	-12.5
18	APR	1980	1000	109.416664	86.337540	-23.948475	-24.5	-12.7
18	APR	1980	1100	109.458336	86.329445	-24.019291	-25.0	-13.7
18	APR	1980	1126	109.477176	86.325714	-24.048935	-24.2	-11.0
18	APR	1980	1144	109.488882	86.323647	-24.062300	-23.5	-8.7
18	APR	1980	1200	109.500000	86.321652	-24.072231	-22.6	-5.0
18	APR	1980	1300	109.541664	86.314629	-24.082771	-21.6	0.5
18	APR	1980	1315	109.552788	86.312859	-24.081506	-22.0	1.0
18	APR	1980	1400	109.583336	86.307289	-24.077224	-23.9	0.2
18	APR	1980	1500	109.625000	86.299244	-24.044072	-25.1	-4.5
18	APR	1980	1600	109.666664	86.291397	-24.122605	-22.6	-8.9
18	APR	1980	1700	109.708336	86.284752	-24.171516	-18.6	-10.1
18	APR	1980	1704	109.711113	86.284355	-24.174862	-18.4	-10.0
18	APR	1980	1800	109.750000	86.278915	-24.219406	-18.5	-8.9
18	APR	1980	1811	109.757637	86.277794	-24.227383	-19.2	-8.5
18	APR	1980	1850	109.784721	86.273552	-24.252954	-20.8	-7.2
18	APR	1980	1900	109.791664	86.272423	-24.254774	-21.1	-6.8
18	APR	1980	2000	109.833336	86.265320	-24.287264	-22.8	-4.7
18	APR	1980	2037	109.859032	86.260651	-24.300587	-23.7	-4.2
18	APR	1980	2100	109.875000	86.257588	-24.309046	-23.7	-4.7
18	APR	1980	2200	109.916664	86.250488	-24.342596	-19.7	-9.7
18	APR	1980	2210	109.923615	86.249451	-24.351141	-19.7	-11.0
18	APR	1980	2223	109.932646	86.248184	-24.363745	-17.4	-12.5
18	APR	1980	2300	109.958336	86.244855	-24.404718	-16.8	-13.2
18	APR	1980	2328	109.977776	86.242149	-24.432175	-19.4	-10.1
19	APR	1980	0	110.000000	86.238472	-24.452124	-23.0	-4.9
19	APR	1980	100	110.041664	86.230644	-24.469289	-23.1	-0.5
19	APR	1980	114	110.051392	86.228951	-24.481155	-21.0	-1.0
19	APR	1980	143	110.071528	86.225607	-24.485454	-18.6	-2.7
19	APR	1980	200	110.083336	86.224174	-24.470184	-17.1	-4.0
19	APR	1980	300	110.125000	86.219009	-24.497725	-16.0	-2.4
19	APR	1980	300	110.125000	86.219009	-24.497725	-16.0	-6.4

## FRAM 2 NAVIGATION - KALMAJ

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
19	APR	1980	400	110.166664	86.213470	-24.529772	-18.0	-6.6
19	APR	1980	446	110.198698	86.208977	-24.555332	-17.7	-7.1
19	APR	1980	500	110.203336	86.207657	-24.563589	-17.3	-7.3
19	APR	1980	600	110.250000	86.202492	-24.599979	-14.3	-7.1
19	APR	1980	632	110.272224	86.200150	-24.617170	-12.9	-6.0
19	APR	1980	700	110.291664	86.198212	-24.629484	-12.9	-4.8
19	APR	1980	703	110.293755	86.197998	-24.630640	-13.0	-4.6
19	APR	1980	718	110.304169	86.196938	-24.635912	-13.4	-4.0
19	APR	1980	800	110.333336	86.193718	-24.647755	-15.1	-3.2
19	APR	1980	850	110.363050	86.189468	-24.661745	-15.9	-3.9
19	APR	1980	900	110.375000	86.188606	-24.664972	-15.7	-4.1
19	APR	1980	905	110.378471	86.188187	-24.666658	-15.6	-4.2
19	APR	1980	1000	110.415564	86.183632	-24.685467	-15.2	-3.6
19	APR	1980	1038	110.443054	86.180504	-24.693638	-15.3	-1.7
19	APR	1980	1052	110.452782	86.179352	-24.695135	-15.3	-1.0
19	APR	1980	1100	110.458336	86.178688	-24.695646	-15.2	-0.6
19	APR	1980	1148	110.491669	86.174858	-24.698072	-13.8	-1.7
19	APR	1980	1200	110.500000	86.173981	-24.700260	-13.2	-2.8
19	APR	1980	1226	110.518059	86.172211	-24.708376	-12.1	-4.8
19	APR	1980	1300	110.541664	86.170067	-24.724140	-11.3	-6.4
19	APR	1980	1334	110.565277	86.168022	-24.742228	-11.0	-6.5
19	APR	1980	1400	110.593336	86.166473	-24.755194	-11.2	-5.7
19	APR	1980	1413	110.592354	86.165680	-24.760857	-11.4	-5.1
19	APR	1980	1500	110.625000	86.162758	-24.776695	-11.3	-3.5
19	APR	1980	1518	110.637505	86.161682	-24.781616	-10.8	-3.3
19	APR	1980	1600	110.666664	86.159409	-24.792662	-9.2	-3.4
19	APR	1980	1700	110.708336	86.156738	-24.809896	-7.7	-3.5
19	APR	1980	1704	110.711113	86.156570	-24.811033	-7.7	-3.5
19	APR	1980	1800	110.750000	86.154221	-24.825127	-8.1	-2.5
19	APR	1980	1849	110.784027	86.151955	-24.832422	-9.1	-1.2
19	APR	1980	1900	110.791664	86.151405	-24.833328	-9.3	-0.9
19	APR	1980	2000	110.833336	86.148308	-24.835461	-9.6	-0.4
19	APR	1980	2100	110.875000	86.145376	-24.840191	-8.2	-1.9
19	APR	1980	2121	110.889567	86.144485	-24.844097	-7.5	-2.7
19	APR	1980	2200	110.916664	86.143051	-24.854929	-6.2	-4.1
19	APR	1980	2300	110.958336	86.141197	-24.876640	-5.5	-4.4
20	APR	1980	0	111.000000	86.139297	-24.893875	-5.4	-2.4
20	APR	1980	6	111.004173	86.139091	-24.894985	-6.5	-2.2
20	APR	1980	100	111.041664	86.137016	-24.899776	-7.5	-0.3
20	APR	1980	152	111.077782	86.134842	-24.899456	-7.8	0.2
20	APR	1980	200	111.083336	86.134506	-24.899353	-7.9	0.1
20	APR	1980	240	111.111115	86.132797	-24.899275	-8.0	-0.1
20	APR	1980	300	111.125000	86.131927	-24.899536	-8.0	-0.2
20	APR	1980	336	111.151336	86.130302	-24.900605	-7.7	-0.5
20	APR	1980	400	111.156664	86.129417	-24.901559	-7.2	-0.6
20	APR	1980	500	111.203336	86.127386	-24.905266	-5.3	-1.1
20	APR	1980	600	111.250000	86.125999	-24.912344	-3.4	-1.7
20	APR	1980	700	111.291664	86.125084	-24.921476	-2.4	-2.1
20	APR	1980	710	111.294615	86.124954	-24.923141	-2.4	-2.1
20	APR	1980	800	111.333336	86.124321	-24.931517	-2.4	-2.0
20	APR	1980	900	111.375000	86.123497	-24.939114	-2.7	-1.0
20	APR	1980	1000	111.416664	86.122551	-24.939360	-3.1	1.0
20	APR	1980	1100	111.458336	86.121521	-24.928495	-3.2	3.5
20	APR	1980	1200	111.500000	86.120552	-24.906296	-2.8	5.0
20	APR	1980	1300	111.541664	86.119759	-24.878412	-2.0	5.6
20	APR	1980	1323	111.557640	86.119522	-24.868641	-1.7	5.0
20	APR	1980	1400	111.583336	86.119240	-24.856206	-1.1	3.3
20	APR	1980	1440	111.596973	86.119179	-24.853643	-1.0	2.6
20	APR	1980	1500	111.625000	86.119011	-24.848835	-0.4	0.0
20	APR	1980	1556	111.658336	86.118955	-24.851387	0.0	-0.6
20	APR	1980	1600	111.666664	86.118965	-24.851578	0.0	-0.6
20	APR	1980	1700	111.708336	86.118980	-24.851311	0.0	0.7
20	APR	1980	1741	111.738809	86.118973	-24.847574	-0.1	1.5
20	APR	1980	1800	111.750000	86.118958	-24.845154	-0.2	1.7
20	APR	1980	1900	111.791664	86.118858	-24.836254	-0.4	1.8
20	APR	1980	2000	111.833336	86.118664	-24.828547	-0.5	1.3
20	APR	1980	2100	111.875000	86.118515	-24.824664	-0.6	0.6
20	APR	1980	2200	111.916664	86.118301	-24.822605	-0.7	0.1

# FRAM 2 NAVIGATION - KALMAN

LY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
20	APR	1980	2258	111.956940	86.118042	-24.822241	-1.0	0.2
20	APR	1980	2300	111.958336	86.118034	-24.822216	-1.0	0.2
21	APR	1980	0	112.009000	86.117607	-24.819988	-1.6	0.9
21	APR	1980	4	112.092777	86.117577	-24.819702	-1.7	0.9
21	APR	1980	44	112.030556	86.117172	-24.815792	-2.0	1.5
21	APR	1980	100	112.041664	86.116997	-24.813745	-2.0	1.7
21	APR	1980	200	112.083336	86.116333	-24.805172	-2.0	1.6
21	APR	1980	230	112.104164	86.116028	-24.801777	-1.8	1.2
21	APR	1980	300	112.125000	86.115746	-24.799604	-1.6	0.6
21	APR	1980	400	112.166666	86.115288	-24.798779	-1.2	-0.2
21	APR	1980	500	112.208336	86.114937	-24.799908	-0.9	-0.1
21	APR	1980	600	112.250000	86.114662	-24.798119	-0.8	1.0
21	APR	1980	700	112.291664	86.114426	-24.789965	-0.7	2.4
21	APR	1980	748	112.325005	86.114250	-24.779612	-0.6	2.9
21	APR	1980	800	112.333336	86.114212	-24.776875	-0.6	2.9
21	APR	1980	859	112.374306	86.114021	-24.765617	-0.6	1.5
21	APR	1980	900	112.375000	86.114021	-24.765497	-0.6	1.5
21	APR	1980	1000	112.416664	86.113747	-24.762655	-1.3	0.0
21	APR	1980	1046	112.448608	86.113266	-24.762300	-2.5	0.4
21	APR	1980	1100	112.458336	86.113068	-24.751745	-2.9	0.6
21	APR	1980	1200	112.500000	86.111954	-24.756891	-3.7	1.1
21	APR	1980	1234	112.523613	86.111282	-24.754421	-3.6	0.6
21	APR	1980	1300	112.541664	86.110786	-24.754021	-3.5	-0.3
21	APR	1980	1304	112.544441	86.110710	-24.754126	-3.5	-0.4
21	APR	1980	1400	112.583336	86.109604	-24.759983	-4.0	-2.0
21	APR	1980	1421	112.597923	86.109131	-24.763681	-4.4	-2.4
21	APR	1980	1449	112.617363	86.108429	-24.769249	-4.9	-2.6
21	APR	1980	1500	112.625000	86.108139	-24.771511	-5.0	-2.6
21	APR	1980	1600	112.666664	86.106483	-24.781527	-4.8	-1.1
21	APR	1980	1608	112.672218	86.106277	-24.782118	-4.6	-0.7
21	APR	1980	1634	112.690277	86.105659	-24.782578	-4.2	0.2
21	APR	1980	1700	112.708336	86.105103	-24.781647	-3.8	0.6
21	APR	1980	1800	112.750000	86.103905	-24.778736	-3.7	0.3
21	APR	1980	1819	112.763191	86.103516	-24.778448	-3.8	0.0
21	APR	1980	1900	112.791664	86.102646	-24.779320	-4.0	-0.5
21	APR	1980	2000	112.833336	86.101311	-24.783264	-4.1	-1.0
21	APR	1980	2100	112.875000	86.100021	-24.788410	-3.8	-1.1
21	APR	1980	2200	112.916664	86.098846	-24.793125	-3.4	-0.9
21	APR	1980	2256	112.955559	86.097794	-24.796791	-3.7	-0.8
21	APR	1980	2300	112.958336	86.097717	-24.797043	-3.7	-0.8
21	APR	1980	2336	112.963337	86.096931	-24.799410	-4.4	-0.9
22	APR	1980	0	113.000000	86.096336	-24.801144	-4.9	-0.9
22	APR	1980	100	113.041664	86.094627	-24.805662	-5.4	-0.9
22	APR	1980	162	113.083336	86.094574	-24.805769	-5.4	-0.9
22	APR	1980	122	113.066666	86.093987	-24.807070	-5.4	-0.7
22	APR	1980	200	113.083336	86.092689	-24.809638	-5.5	-0.6
22	APR	1980	300	113.125000	86.091649	-24.811977	-5.9	-0.3
22	APR	1980	308	113.130554	86.090796	-24.812496	-5.9	-0.6
22	APR	1980	400	113.166664	86.089081	-24.817379	-5.2	-1.6
22	APR	1980	454	113.204163	86.087286	-24.825571	-6.1	-2.2
22	APR	1980	500	113.208336	86.087082	-24.826612	-6.0	-2.2
22	APR	1980	600	113.250000	86.085243	-24.835941	-5.2	-1.3
22	APR	1980	649	113.277779	86.084196	-24.837837	-4.6	0.1
22	APR	1980	700	113.291664	86.083710	-24.837623	-4.3	0.9
22	APR	1980	751	113.327987	86.082527	-24.833145	-4.5	1.5
22	APR	1980	800	113.333336	86.082306	-24.830416	-4.6	1.4
22	APR	1980	900	113.375000	86.080612	-24.826134	-5.0	0.1
22	APR	1980	1000	113.416664	86.078423	-24.829746	-7.3	-1.3
22	APR	1980	1100	113.458336	86.075813	-24.833945	-8.4	-2.4
22	APR	1980	1145	113.489586	86.073730	-24.847952	-8.7	-2.2
22	APR	1980	1200	113.500000	86.073029	-24.850542	-8.7	-2.1
22	APR	1980	1300	113.541664	86.070198	-24.859462	-8.8	-1.6
22	APR	1980	1332	113.563596	86.068680	-24.863115	-8.7	-1.3
22	APR	1980	1400	113.583336	86.067360	-24.865869	-8.7	-1.1
22	APR	1980	1500	113.625000	86.064568	-24.870565	-8.4	-0.9
22	APR	1980	1520	113.633665	86.063667	-24.871916	-8.2	-0.8
22	APR	1980	1600	113.666664	86.061935	-24.874405	-7.8	-0.7
22	APR	1980	1700	113.708336	86.059509	-24.877546	-7.2	-0.6

DY	MON	YEAR	GST	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
22	APR	1980	1800	113.750000	86.057274	-24.879467	-6.7	-0.2
22	APR	1980	1900	113.791664	86.055145	-24.879221	-6.5	0.4
22	APR	1980	2000	113.833336	86.053017	-24.875799	-6.7	1.1
22	APR	1980	2100	113.875000	86.050743	-24.868465	-7.3	2.0
22	APR	1980	2200	113.916664	86.048246	-24.857151	-8.1	2.8
22	APR	1980	2228	113.936104	86.046997	-24.850702	-8.5	3.1
22	APR	1980	2300	113.958336	86.045486	-24.842587	-8.9	3.4
23	APR	1980	0	114.000000	86.042480	-24.826206	-9.5	3.5
23	APR	1980	100	114.041664	86.039360	-24.810835	-9.7	3.0
23	APR	1980	140	114.069450	86.037277	-24.802555	-9.6	2.3
23	APR	1980	200	114.083336	86.036247	-24.799206	-9.5	2.0
23	APR	1980	300	114.125000	86.033226	-24.792498	-9.1	0.9
23	APR	1980	400	114.166664	86.030327	-24.790548	-8.8	0.0
23	APR	1980	500	114.208336	86.027534	-24.792059	-8.5	-0.6
23	APR	1980	600	114.250000	86.024602	-24.794935	-8.4	-0.6
23	APR	1980	700	114.291664	86.022072	-24.796785	-8.5	-0.1
23	APR	1980	800	114.333336	86.019272	-24.795456	-8.8	0.7
23	APR	1980	849	114.367363	86.016891	-24.790989	-9.2	1.6
23	APR	1980	900	114.375000	86.016342	-24.789526	-9.2	1.8
23	APR	1980	1000	114.416664	86.013268	-24.778797	-9.7	2.7
23	APR	1980	1100	114.458336	86.010063	-24.764490	-10.0	3.3
23	APR	1980	1200	114.500000	86.006775	-24.748907	-10.2	3.3
23	APR	1980	1300	114.541664	86.003471	-24.734989	-10.1	2.6
23	APR	1980	1400	114.583336	86.000229	-24.725851	-9.8	1.2
23	APR	1980	1500	114.625000	86.997116	-24.724308	-9.3	-0.7
23	APR	1980	1600	114.666664	86.994202	-24.732418	-8.7	-2.9
23	APR	1980	1700	114.708336	86.991501	-24.751000	-8.0	-5.1
23	APR	1980	1745	114.739586	86.989624	-24.771461	-7.5	-6.6
23	APR	1980	1800	114.750000	86.989029	-24.779385	-7.3	-7.1
23	APR	1980	1900	114.791664	86.986732	-24.815464	-6.9	-8.3
23	APR	1980	1950	114.825365	86.984894	-24.848433	-6.7	-8.6
23	APR	1980	2000	114.833336	86.984528	-24.855101	-6.7	-8.6
23	APR	1980	2100	114.875000	86.982353	-24.894318	-6.7	-8.2
23	APR	1980	2200	114.916664	86.980141	-24.929504	-6.9	-6.9
23	APR	1980	2300	114.958336	86.977859	-24.957813	-7.1	-5.2
24	APR	1980	0	115.000000	86.975510	-24.977459	-7.3	-3.2
24	APR	1980	100	115.041664	86.973114	-24.987646	-7.5	-1.2
24	APR	1980	200	115.083336	86.970680	-24.988460	-7.5	0.8
24	APR	1980	300	115.125000	86.968269	-24.980881	-7.4	2.5
24	APR	1980	400	115.166664	86.965904	-24.966505	-7.2	3.7
24	APR	1980	500	115.208336	86.963615	-24.947653	-6.9	4.4
24	APR	1980	600	115.250000	86.961441	-24.927183	-6.5	4.4
24	APR	1980	614	115.250459	86.961090	-24.923744	-6.5	4.3
24	APR	1980	700	115.291664	86.959381	-24.9008155	-6.2	3.8
24	APR	1980	800	115.333336	86.957437	-24.893452	-5.9	2.5
24	APR	1980	900	115.375000	86.955559	-24.885944	-5.7	0.7
24	APR	1980	1000	115.416664	86.953720	-24.887041	-5.7	-1.1
24	APR	1980	1100	115.458336	86.951851	-24.895502	-5.4	-2.4
24	APR	1980	1127	115.477081	86.950989	-24.900663	-5.0	-2.6
24	APR	1980	1200	115.500000	86.949898	-24.907328	-5.2	-2.6
24	APR	1980	1300	115.541664	86.947800	-24.917086	-6.8	-1.3
24	APR	1980	1312	115.549445	86.947350	-24.918083	-6.9	-0.9
24	APR	1980	1400	115.583336	86.945457	-24.917940	-7.7	0.9
24	APR	1980	1457	115.622917	86.943024	-24.912176	-7.9	1.3
24	APR	1980	1500	115.625000	86.942694	-24.911892	-7.9	1.3
24	APR	1980	1526	115.643750	86.941811	-24.910158	-7.5	1.5
24	APR	1980	1600	115.683336	86.940491	-24.910311	-6.8	-0.5
24	APR	1980	1642	115.725000	86.938945	-24.912544	-6.4	-0.6
24	APR	1980	1700	115.758336	86.938370	-24.913644	-6.5	-0.2
24	APR	1980	1717	115.775000	86.937950	-24.913657	-6.5	0.1
24	APR	1980	1800	115.750000	86.936241	-24.911701	-6.7	0.7
24	APR	1980	1827	115.773745	86.935749	-24.909854	-6.9	0.6
24	APR	1980	1854	115.790276	86.934097	-24.908011	-6.8	0.2
24	APR	1980	1900	115.791664	86.9334021	-24.908880	-6.7	0.2
24	APR	1980	2000	115.833336	86.931940	-24.909569	-6.1	-0.4
24	APR	1980	2044	115.863892	86.930481	-24.911125	-6.2	-0.5
24	APR	1980	2100	115.875000	86.929939	-24.911634	-6.4	-0.4
24	APR	1980	2200	115.916664	86.927711	-24.912365	-7.2	0.1

## FRAM 2 NAVIGATION - KALVAN

DY	MON	YEAR	GMT	JULIAN	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
24	APR	1980	2300	115.9553336	85.925293	-24.910143	-7.6	0.8
24	APR	1980	2344	115.968892	85.923508	-24.906822	-7.4	1.1
25	APR	1980	0	116.000000	85.922867	-24.905467	-7.3	1.2
25	APR	1980	100	116.041004	85.920509	-24.900066	-7.4	1.0
25	APR	1980	130	116.062500	85.919289	-24.898066	-7.5	0.7
25	APR	1980	200	116.0833336	85.918030	-24.896723	-7.9	0.5
25	APR	1980	300	116.125000	85.915436	-24.895699	-8.0	0.0
25	APR	1980	316	116.135108	85.914749	-24.895754	-7.9	-0.1
25	APR	1980	400	116.1666664	85.912865	-24.897196	-7.9	-0.9
25	APR	1980	500	116.2083336	85.910210	-24.904871	-8.6	-2.4
25	APR	1980	502	116.209724	85.910110	-24.905239	-8.6	-2.4
25	APR	1980	600	116.250000	85.907265	-24.913673	-9.4	-0.3
25	APR	1980	648	116.2833333	85.904770	-24.905354	-9.7	5.2
25	APR	1980	700	116.291664	85.904144	-24.899944	-9.7	6.7
25	APR	1980	800	116.3333336	85.900955	-24.859791	-10.1	9.2
25	APR	1980	900	116.375000	85.897552	-24.831980	-11.0	1.5
25	APR	1980	1000	116.416664	85.893883	-24.847162	-11.4	-6.8
25	APR	1980	1019	116.429803	85.892715	-24.857679	-11.3	-7.7
25	APR	1980	1100	116.4583336	85.890305	-24.877480	-10.3	-3.4
25	APR	1980	1100	116.4583336	85.890305	-24.877480	-10.3	-3.4
25	APR	1980	1200	116.500000	85.887100	-24.869444	-10.1	5.0
25	APR	1980	1204	116.502777	85.886879	-24.867903	-10.2	5.2
25	APR	1980	1300	116.541004	85.883545	-24.844904	-11.8	4.7
25	APR	1980	1349	116.575091	85.880318	-24.831865	-12.4	2.7
25	APR	1980	1400	116.5833336	85.879578	-24.829752	-12.4	2.4
25	APR	1980	1500	116.625000	85.875572	-24.819780	-12.4	2.4
25	APR	1980	1534	116.648013	85.873253	-24.812918	-12.7	3.1
25	APR	1980	1600	116.6666664	85.871445	-24.806299	-13.0	3.7
25	APR	1980	1700	116.7083336	85.867119	-24.785494	-13.0	5.5
25	APR	1980	1719	116.721527	85.865715	-24.777195	-13.7	6.1
25	APR	1980	1800	116.750000	85.862648	-24.757322	-14.0	6.6
25	APR	1980	1900	116.791004	85.858017	-24.731092	-14.6	4.4
25	APR	1980	1904	116.794441	85.857697	-24.729610	-14.7	4.1
25	APR	1980	2000	116.8333336	85.853165	-24.720264	-15.2	0.6
25	APR	1980	2100	116.875000	85.848267	-24.722595	-14.8	-0.9
25	APR	1980	2200	116.9166664	85.843620	-24.723316	-13.7	1.2
25	APR	1980	2236	116.941073	85.841026	-24.717041	-13.0	3.5
25	APR	1980	2300	116.9583336	85.839383	-24.706393	-12.6	5.0
26	APR	1980	0	117.000000	85.835289	-24.682022	-12.8	0.5
26	APR	1980	22	117.015282	85.833733	-24.671507	-13.3	6.3
26	APR	1980	100	117.041004	85.830925	-24.654804	-14.1	5.5
26	APR	1980	105	117.045135	85.830544	-24.652784	-14.2	5.4
26	APR	1980	200	117.0833336	85.825233	-24.633144	-14.6	4.3
26	APR	1980	206	117.086990	85.825007	-24.633604	-14.6	4.2
26	APR	1980	300	117.125000	85.821504	-24.615270	-14.0	3.8
26	APR	1980	354	117.152098	85.817004	-24.598940	-13.1	3.3
26	APR	1980	400	117.165504	85.817164	-24.599517	-12.0	3.2
26	APR	1980	440	117.174450	85.814401	-24.591438	-12.2	2.2
26	APR	1980	500	117.2083336	85.813148	-24.586690	-12.0	1.5
26	APR	1980	540	117.235115	85.810600	-24.585789	-11.6	0.9
26	APR	1980	600	117.250000	85.809435	-24.585133	-11.4	0.4
26	APR	1980	623	117.269440	85.807603	-24.584310	-11.0	0.0
26	APR	1980	700	117.291664	85.805840	-24.581746	-10.0	2.0
26	APR	1980	726	117.309723	85.804497	-24.576134	-9.1	3.8
26	APR	1980	800	117.3333336	85.802902	-24.573694	-8.4	5.0
26	APR	1980	815	117.343750	85.802223	-24.573694	-8.4	5.0
26	APR	1980	900	117.375000	85.800140	-24.563575	-9.0	6.1
26	APR	1980	1000	117.416664	85.795997	-24.552642	-10.2	7.2
26	APR	1980	1050	117.435559	85.793938	-24.473385	-9.6	7.4
26	APR	1980	1100	117.4583336	85.793732	-24.471215	-9.5	7.3
26	APR	1980	1144	117.472503	85.791426	-24.443747	-7.8	5.0
26	APR	1980	1200	117.500000	85.790970	-24.444145	-7.4	4.2
26	APR	1980	1242	117.529107	85.789444	-24.434546	-5.2	2.6
26	APR	1980	1300	117.541004	85.788657	-24.431059	-5.9	2.8
26	APR	1980	1336	117.555573	85.787727	-24.422907	-5.7	3.5
26	APR	1980	1400	117.5833336	85.786972	-24.418321	-5.9	4.0
26	APR	1980	1427	117.592051	85.786087	-24.407451	-5.2	4.4
26	APR	1980	1500	117.625000	85.784920	-24.397135	-6.0	4.5

DAY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	N-VFL.	E-VFL.
26	APR	1980	1522	117.6490282	85.784073	-24.390043	-7.3	4.3
26	APR	1980	1600	117.6666664	85.782509	-24.378679	-7.9	3.8
26	APR	1980	1612	117.674995	85.781990	-24.375399	-7.9	3.6
26	APR	1980	1700	117.704336	85.779984	-24.363272	-7.2	3.4
26	APR	1980	1709	117.714577	85.779640	-24.360491	-6.9	3.5
26	APR	1980	1757	117.747917	85.778069	-24.348602	-5.3	3.4
26	APR	1980	1800	117.750000	85.777977	-24.347851	-5.2	3.4
26	APR	1980	1850	117.738887	85.776466	-24.335743	-5.3	2.3
26	APR	1980	1900	117.791064	85.776352	-24.335081	-5.4	2.2
26	APR	1980	1942	117.820831	85.775055	-24.328718	-5.7	2.4
26	APR	1980	2000	117.833336	85.774513	-24.325081	-5.4	3.1
26	APR	1980	2100	117.875000	85.773010	-24.305746	-3.8	5.5
26	APR	1980	2200	117.915064	85.772011	-24.280148	-2.7	5.4
26	APR	1980	2229	117.936800	85.771591	-24.270094	-2.7	4.0
26	APR	1980	2300	117.958336	85.771126	-24.262720	-2.8	2.4
27	APR	1980	0	118.000000	85.770256	-24.256952	-2.4	0.6
27	APR	1980	100	118.041064	85.769638	-24.254223	-1.5	1.0
27	APR	1980	100	118.041064	85.769638	-24.254223	-1.5	1.0
27	APR	1980	200	118.083336	85.769218	-24.248131	-1.4	1.6
27	APR	1980	204	118.085113	85.769188	-24.247675	-1.4	1.6
27	APR	1980	246	118.115273	85.768522	-24.243223	-1.7	1.3
27	APR	1980	300	118.125000	85.768700	-24.241985	-1.6	1.1
27	APR	1980	351	118.150423	85.768265	-24.238500	-1.5	0.8
27	APR	1980	400	118.160064	85.768190	-24.238004	-1.4	0.7
27	APR	1980	432	118.183690	85.767980	-24.236345	-1.3	0.8
27	APR	1980	500	118.208336	85.767784	-24.234632	-1.0	0.9
27	APR	1980	539	118.235413	85.767609	-24.231937	-0.7	0.9
27	APR	1980	600	118.250000	85.767540	-24.230503	-0.5	0.9
27	APR	1980	618	118.252505	85.767494	-24.229305	-0.4	0.9
27	APR	1980	700	118.291064	85.767403	-24.226286	-0.4	1.1
27	APR	1980	726	118.309723	85.767342	-24.223618	-0.5	1.5
27	APR	1980	800	118.333336	85.767250	-24.219555	-0.5	2.0
27	APR	1980	900	118.375000	85.767130	-24.209750	-0.2	2.4
27	APR	1980	1000	118.415064	85.767136	-24.200012	0.2	1.6
27	APR	1980	1100	118.455033	85.767281	-24.195013	0.6	0.4
27	APR	1980	1135	118.462035	85.767387	-24.194925	0.6	-0.3
27	APR	1980	1200	118.500000	85.767464	-24.195890	0.5	-0.7
27	APR	1980	1300	118.541064	85.767544	-24.199106	-0.1	-0.5
27	APR	1980	1320	118.555036	85.767525	-24.199482	-0.4	-0.1
27	APR	1980	1400	118.583336	85.767403	-24.199083	-0.6	0.2
27	APR	1980	1434	118.609941	85.767303	-24.199219	-0.4	-0.4
27	APR	1980	1500	118.625000	85.767285	-24.200097	-0.1	-1.2

## FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMI	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
28	APR	1980	1100	119.453333	85.770752	-24.237299	-0.8	0.7
28	APR	1980	1159	119.499306	85.770409	-24.235949	-1.2	0.1
28	APR	1980	1200	119.500000	85.770401	-24.235943	-1.2	0.1
28	APR	1980	1212	119.503331	85.770332	-24.235909	-1.2	0.0
28	APR	1980	1300	119.541004	85.770180	-24.235840	0.0	0.1
28	APR	1980	1400	119.563330	85.770360	-24.235833	1.2	-0.1
28	APR	1980	1500	119.620000	85.770374	-24.237551	1.6	-0.9
28	APR	1980	1545	119.655250	85.771286	-24.241619	1.8	-1.3
28	APR	1980	1600	119.666004	85.771439	-24.243440	1.8	-1.3
28	APR	1980	1700	119.708336	85.772285	-24.251366	3.8	-1.5
28	APR	1980	1719	119.721527	85.772720	-24.253250	4.8	-1.5
28	APR	1980	1800	119.750000	85.774048	-24.255644	7.1	-0.5
28	APR	1980	1900	119.791604	85.776817	-24.257574	9.5	-0.3
28	APR	1980	2000	119.833330	85.780052	-24.265783	9.9	-3.2
28	APR	1980	2100	119.875000	85.783043	-24.286901	8.3	-0.2
28	APR	1980	2106	119.879173	85.783310	-24.289680	8.3	-0.4
28	APR	1980	2200	119.915004	85.785349	-24.316965	6.0	-7.7
28	APR	1980	2230	119.941673	85.786784	-24.332949	6.7	-5.2
28	APR	1980	2300	119.954330	85.787666	-24.340841	6.9	-3.8
28	APR	1980	0	120.000000	85.790639	-24.350870	7.9	-1.0
28	APR	1980	39	120.027077	85.791809	-24.352293	8.9	-0.1
28	APR	1980	100	120.041004	85.792854	-24.352295	9.5	0.1
28	APR	1980	200	120.043330	85.790196	-24.352057	11.0	-0.3
28	APR	1980	300	120.125000	85.799955	-24.356081	12.1	-1.7
28	APR	1980	400	120.165004	85.804001	-24.366895	12.9	-3.2
28	APR	1980	500	120.206330	85.808052	-24.383600	12.3	-4.2
28	APR	1980	600	120.250000	85.811905	-24.403200	11.3	-4.5
28	APR	1980	700	120.291604	85.815353	-24.421957	9.9	-3.0
28	APR	1980	731	120.313194	85.816959	-24.430227	9.1	-3.0
28	APR	1980	800	120.333336	85.818329	-24.436813	7.4	-2.1
28	APR	1980	900	120.375000	85.820547	-24.445856	7.2	-1.8
28	APR	1980	1000	120.410004	85.822311	-24.452017	6.8	-1.1
28	APR	1980	1100	120.454330	85.825303	-24.457121	7.2	-0.6
28	APR	1980	1121	120.472423	85.826202	-24.458649	7.5	-0.6
28	APR	1980	1200	120.500000	85.827566	-24.461845	7.5	-1.1
28	APR	1980	1250	120.534741	85.830185	-24.467323	8.2	-1.3
28	APR	1980	1300	120.541004	85.833000	-24.471523	8.6	-1.3
28	APR	1980	1305	120.547210	85.831047	-24.475055	8.9	-1.3
28	APR	1980	1400	120.583330	85.833510	-24.476110	8.5	-1.7
28	APR	1980	1456	120.622423	85.835544	-24.483271	7.8	-1.1
28	APR	1980	1500	120.625000	85.836830	-24.483312	7.5	-1.1
28	APR	1980	1525	120.640000	85.836127	-24.483657	5.6	-2.3
28	APR	1980	1570	120.670000	85.834915	-24.481773	5.7	-3.2
28	APR	1980	1600	120.700000	85.834000	-24.481000	5.3	-3.3
28	APR	1980	1606	120.703330	85.833735	-24.480300	5.5	-3.1
28	APR	1980	2000	120.833330	85.845974	-24.502854	7.3	-0.9
28	APR	1980	2100	120.875000	85.848404	-24.514200	7.3	1.1
28	APR	1980	2144	120.905555	85.850106	-24.514767	7.2	1.0
28	APR	1980	2200	120.915004	85.850777	-24.514673	6.6	0.5
28	APR	1980	2203	120.915755	85.850853	-24.514662	6.9	0.5
28	APR	1980	2300	120.953330	85.852814	-24.514950	5.7	2.2
31	MAY	1980	0	121.000000	85.854515	-24.506654	5.0	5.0
31	MAY	1980	100	121.041004	85.856222	-24.506674	5.8	5.2
31	MAY	1980	136	121.050000	85.857437	-24.506600	5.7	4.0
31	MAY	1980	200	121.053330	85.854360	-24.506231	7.1	3.0
31	MAY	1980	300	121.120000	85.860470	-24.517105	8.0	3.7
31	MAY	1980	400	121.150000	85.863603	-24.517535	8.1	3.2
31	MAY	1980	500	121.200000	85.866055	-24.517000	8.4	3.5
31	MAY	1980	550	121.251000	85.867100	-24.525000	8.4	2.6
31	MAY	1980	657	121.244501	85.869271	-24.530100	4.4	4.4
31	MAY	1980	700	121.241000	85.869354	-24.531100	4.4	4.4
31	MAY	1980	800	121.333330	85.871819	-24.533000	4.4	5.2
31	MAY	1980	900	121.354000	85.872002	-24.533000	4.4	5.2
31	MAY	1980	1000	121.410000	85.872000	-24.533000	4.4	5.2
31	MAY	1980	1032	121.430000	85.875313	-24.533000	4.4	5.2



## FR44 2      NAVIGATION - PALMAS

DAY	MO	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
31	MAY	1980	1100	121.458336	85.876183	-24.720196	5.7	-3.2
31	MAY	1980	1159	121.499336	85.877753	-24.734491	4.7	-3.4
31	MAY	1980	1200	121.500000	85.877876	-24.737477	4.6	-3.4
31	MAY	1980	1219	121.513191	85.878334	-24.739667	4.2	-3.5
31	MAY	1980	1300	121.541864	85.879186	-24.750759	3.3	-3.5
31	MAY	1980	1400	121.553336	85.880142	-24.765781	2.8	-3.1
31	MAY	1980	1405	121.554752	85.880234	-24.767153	2.8	-3.0
31	MAY	1980	1500	121.625000	85.881073	-24.760106	3.0	-3.2
31	MAY	1980	1533	121.647919	85.881615	-24.791739	3.0	-3.2
31	MAY	1980	1554	121.652496	85.881958	-24.800102	2.9	-3.0
31	MAY	1980	1600	121.655000	85.882050	-24.802874	2.9	-3.2
31	MAY	1980	1658	121.706440	85.882935	-24.833502	2.9	-3.5
31	MAY	1980	1700	121.708336	85.882965	-24.834637	2.9	-3.5
31	MAY	1980	1719	121.721527	85.883278	-24.845490	3.1	-3.6
31	MAY	1980	1800	121.757000	85.883945	-24.854532	3.3	-3.7
31	MAY	1980	1843	121.779554	85.884769	-24.868839	3.3	-3.7
31	MAY	1980	1900	121.781000	85.885117	-24.869438	3.5	-4.3
31	MAY	1980	1906	121.785537	85.885231	-24.869438	3.5	-4.3
31	MAY	1980	2000	121.833336	85.885353	-24.909657	4.1	-2.9
31	MAY	1980	2100	121.875000	85.887310	-24.922471	4.3	-3.1
31	MAY	1980	2114	121.884727	85.888176	-24.925213	4.3	-3.2
31	MAY	1980	2200	121.916666	85.889359	-24.933257	4.5	-3.5
31	MAY	1980	2214	121.926392	85.889657	-24.944401	4.2	-3.4
31	MAY	1980	2300	121.954336	85.890692	-24.963675	3.2	-3.9
1	MAY	1980	0	122.000000	85.891624	-24.997705	3.6	-3.6
1	MAY	1980	0	122.000000	85.891624	-24.997705	3.6	-3.6
1	MAY	1980	47	122.032646	85.892776	-25.017803	5.7	-4.3
1	MAY	1980	100	122.041864	85.893201	-25.022224	6.4	-3.5
1	MAY	1980	146	122.073500	85.894989	-25.035172	7.4	-3.5
1	MAY	1980	200	122.083336	85.895535	-25.035693	7.7	-3.5
1	MAY	1980	300	122.125000	85.897152	-25.055786	5.5	-3.9
1	MAY	1980	332	122.147224	85.898544	-25.065544	4.5	-3.1
1	MAY	1980	400	122.155000	85.899415	-25.078393	3.6	-3.2
1	MAY	1980	500	122.208336	85.900628	-25.092426	3.6	-3.3
1	MAY	1980	518	122.220433	85.900574	-25.095067	3.6	-3.3
1	MAY	1980	600	122.250000	85.901227	-25.108454	2.4	-3.3
1	MAY	1980	700	122.291666	85.902742	-25.122215	2.5	-2.2
1	MAY	1980	794	122.294141	85.902145	-25.122555	2.5	-2.1
1	MAY	1980	800	122.333336	85.903336	-25.125511	2.5	-2.3
1	MAY	1980	900	122.375000	85.903358	-25.127819	1.2	-3.7
1	MAY	1980	952	122.381222	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	982	122.411667	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1000	122.411667	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1100	122.451667	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1200	122.451667	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1300	122.513336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1369	122.541864	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1400	122.553336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1409	122.553336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1435	122.553336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1441	122.553336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1500	122.625000	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1504	122.625000	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1529	122.633336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1555	122.655000	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1600	122.655000	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1700	122.733336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1739	122.754727	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1800	122.754727	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	1900	122.781667	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	2000	122.833336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	2046	122.833336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	2100	122.833336	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	2200	122.916666	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	2212	122.924444	85.903358	-25.128595	1.1	-3.6
1	MAY	1980	2252	122.952778	85.903358	-25.128595	1.1	-3.6



# FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
1	MAY	1980	2300	122.9583336	85.8882222	-25.075306	-6.4	-1.0
1	MAY	1980	2358	122.998604	85.886314	-25.080305	-5.4	-1.0
2	MAY	1980	0	123.000000	85.886261	-25.080456	-5.3	-1.0
2	MAY	1980	38	123.026390	85.885277	-25.082788	-4.3	-0.7
2	MAY	1980	100	123.041664	85.884781	-25.083773	-4.0	-0.5
2	MAY	1980	200	123.0633336	85.883537	-25.086309	-3.8	-0.7
2	MAY	1980	224	123.099998	85.883026	-25.087845	-4.0	-1.0
2	MAY	1980	300	123.125000	85.882179	-25.090933	-4.8	-1.3
2	MAY	1980	306	123.129173	85.882019	-25.091518	-5.0	-1.3
2	MAY	1980	400	123.166664	85.880379	-25.096962	-6.2	-1.2
2	MAY	1980	410	123.173615	85.880035	-25.097828	-6.4	-1.1
2	MAY	1980	454	123.204103	85.878410	-25.099857	-7.4	0.1
2	MAY	1980	500	123.2083336	85.878174	-25.099760	-7.5	0.3
2	MAY	1980	556	123.247223	85.875679	-25.092171	-8.9	3.5
2	MAY	1980	600	123.250000	85.875481	-25.091072	-9.0	3.8
2	MAY	1980	641	123.278473	85.873383	-25.076368	-10.0	5.3
2	MAY	1980	700	123.291664	85.872337	-25.068792	-10.4	5.3
2	MAY	1980	800	123.3333336	85.868774	-25.046448	-11.3	4.5
2	MAY	1980	828	123.352776	85.867065	-25.037184	-11.3	4.4
2	MAY	1980	900	123.375000	85.865150	-25.025824	-10.8	5.3
2	MAY	1980	1000	123.416664	85.861938	-24.992231	-8.8	10.1
2	MAY	1980	1016	123.427773	85.861214	-24.979099	-8.1	11.7
2	MAY	1980	1040	123.444450	85.860222	-24.956434	-7.2	13.2
2	MAY	1980	1100	123.4583336	85.859467	-24.936304	-6.8	13.5
2	MAY	1980	1113	123.467354	85.856994	-24.923214	-6.6	13.4
2	MAY	1980	1200	123.500000	85.857285	-24.878660	-7.2	11.7
2	MAY	1980	1258	123.540276	85.854813	-24.833349	-8.4	9.6
2	MAY	1980	1300	123.541664	85.854721	-24.831903	-8.4	9.6
2	MAY	1980	1349	123.575691	85.852524	-24.797648	-7.7	9.0
2	MAY	1980	1400	123.5833336	85.852081	-24.790487	-7.3	9.0
2	MAY	1980	1415	123.593750	85.851517	-24.780493	-6.7	9.0
2	MAY	1980	1443	123.613190	85.850546	-24.761196	-6.2	9.6
2	MAY	1980	1500	123.625000	85.849968	-24.748600	-6.3	10.2
2	MAY	1980	1536	123.650002	85.848694	-24.719883	-6.8	11.0
2	MAY	1980	1600	123.666664	85.847786	-24.700129	-7.2	11.1
2	MAY	1980	1700	123.703336	85.845329	-24.650616	-7.9	11.1
2	MAY	1980	1722	123.723610	85.844383	-24.632425	-8.1	11.1
2	MAY	1980	1800	123.750000	85.842659	-24.601160	-8.9	10.9
2	MAY	1980	1813	123.759026	85.842018	-24.590658	-9.3	10.8
2	MAY	1980	1900	123.791664	85.839516	-24.553652	-10.1	10.4
2	MAY	1980	1908	123.797218	85.839091	-24.547464	-10.1	10.4
2	MAY	1980	1936	123.816673	85.837576	-24.526017	-9.7	10.2
2	MAY	1980	2000	123.833336	85.836357	-24.507895	-9.0	10.1
2	MAY	1980	2054	123.870827	85.833934	-24.467573	-7.8	10.1
2	MAY	1980	2100	123.875000	85.833687	-24.463064	-7.7	10.1
2	MAY	1980	2123	123.890968	85.832741	-24.445683	-7.5	10.2
2	MAY	1980	2200	123.916664	85.831215	-24.417713	-7.8	9.3
2	MAY	1980	2241	123.945137	85.829407	-24.386166	-8.6	9.0
2	MAY	1980	2300	123.958336	85.828506	-24.375225	-8.9	8.8
2	MAY	1980	2309	123.964577	85.828072	-24.369240	-9.6	8.8
2	MAY	1980	2330	123.979164	85.827042	-24.355469	-9.1	8.8
3	MAY	1980	0	124.000000	85.825592	-24.335934	-8.7	8.8
3	MAY	1980	100	124.011664	85.822968	-24.296595	-7.4	8.8
3	MAY	1980	116	124.052773	85.822342	-24.286245	-7.1	8.7
3	MAY	1980	200	124.083336	85.820755	-24.257908	-6.3	8.8
3	MAY	1980	300	124.125000	85.818817	-24.217302	-5.7	9.4
3	MAY	1980	302	124.126396	85.818756	-24.215004	-5.7	9.4
3	MAY	1980	400	124.166664	85.816956	-24.177628	-5.0	7.8
3	MAY	1980	401	124.167358	85.816925	-24.177054	-5.0	7.7
3	MAY	1980	448	124.200005	85.815285	-24.154388	-7.0	5.7
3	MAY	1980	500	124.208336	85.814819	-24.149471	-7.3	5.4
3	MAY	1980	548	124.241669	85.812813	-24.130728	-7.8	5.5
3	MAY	1980	600	124.250000	85.812309	-24.125757	-7.7	5.7
3	MAY	1980	634	124.273613	85.810928	-24.109788	-7.4	7.1
3	MAY	1980	700	124.291664	85.809698	-24.094683	-7.3	8.5
3	MAY	1980	800	124.333336	85.807434	-24.054518	-8.2	8.7
3	MAY	1980	803	124.335419	85.807304	-24.052603	-8.3	8.6
3	MAY	1980	900	124.375000	85.804649	-24.018175	-8.5	8.6

## FRAM 2 NAVIGATION - KALMAN

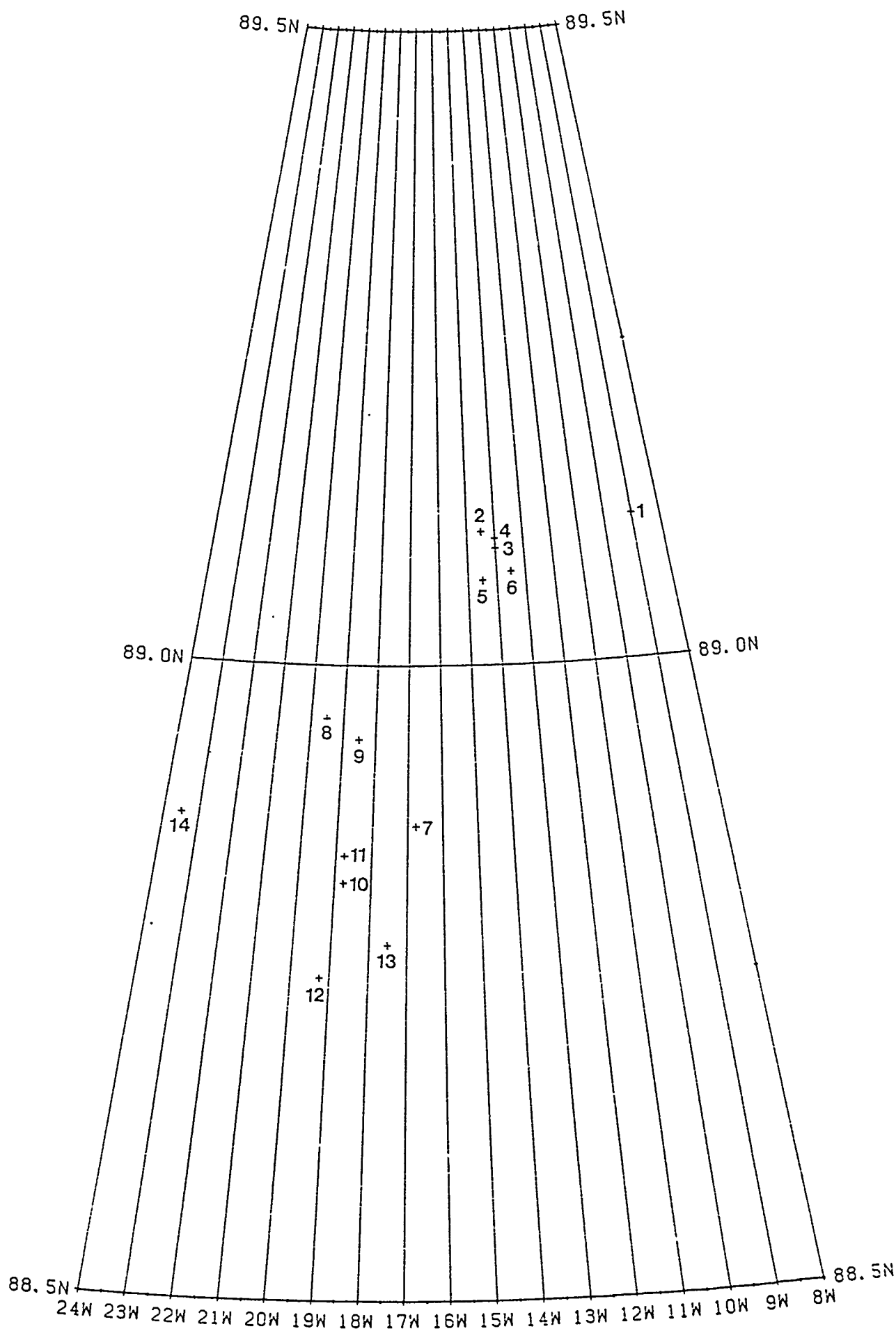
DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
3	MAY	1980	923	124.390964	85.803619	-24.002907	-8.1	9.4
3	MAY	1980	950	124.409721	85.802467	-23.983841	-7.8	9.5
3	MAY	1980	1000	124.416664	85.802040	-23.976927	-7.9	9.2
3	MAY	1980	1005	124.420135	85.801826	-23.973558	-7.9	9.0
3	MAY	1980	1100	124.458336	85.799400	-23.941574	-8.6	6.5
3	MAY	1980	1138	124.484718	85.797577	-23.925791	-9.1	5.1
3	MAY	1980	1200	124.500000	85.796494	-23.917671	-9.2	5.0
3	MAY	1980	1300	124.541664	85.793510	-23.894999	-9.2	5.5
3	MAY	1980	1326	124.559723	85.792221	-23.884203	-9.1	5.8
3	MAY	1980	1400	124.583336	85.790550	-23.869783	-9.1	5.6
3	MAY	1980	1444	124.613892	85.788429	-23.852264	-8.6	5.4
3	MAY	1980	1500	124.625000	85.787689	-23.845882	-8.4	5.5
3	MAY	1980	1513	124.634026	85.787109	-23.840466	-8.1	5.8
3	MAY	1980	1600	124.666664	85.785156	-23.818724	-7.3	6.6
3	MAY	1980	1630	124.687500	85.784004	-23.804262	-7.0	6.4
3	MAY	1980	1700	124.708336	85.782890	-23.791155	-6.9	5.5
3	MAY	1980	1800	124.750000	85.780624	-23.769587	-7.2	4.7
3	MAY	1980	1816	124.761108	85.779991	-23.763937	-7.5	4.9
3	MAY	1980	1900	124.791664	85.778137	-23.747158	-8.1	5.5
3	MAY	1980	2000	124.833336	85.775467	-23.721569	-8.0	5.9
3	MAY	1980	2002	124.831724	85.775383	-23.720703	-8.0	5.9
3	MAY	1980	2034	124.855941	85.774055	-23.707052	-7.2	5.7
3	MAY	1980	2100	124.875000	85.773109	-23.696215	-6.3	5.6
3	MAY	1980	2149	124.909027	85.771584	-23.675009	-5.4	6.5
3	MAY	1980	2200	124.916664	85.771271	-23.669655	-5.3	6.8
3	MAY	1980	2220	124.930550	85.770706	-23.659061	-5.2	7.6
3	MAY	1980	2300	124.958336	85.769608	-23.634657	-4.9	8.9
3	MAY	1980	2335	124.982635	85.768692	-23.611538	-4.8	9.0
4	MAY	1980	0	125.000000	85.768059	-23.595531	-4.6	8.5
4	MAY	1980	100	125.041664	85.766571	-23.562328	-4.5	5.5
4	MAY	1980	200	125.083336	85.765063	-23.537607	-4.7	5.0
4	MAY	1980	300	125.125000	85.763527	-23.516035	-4.9	5.1
4	MAY	1980	309	125.131248	85.763283	-23.512669	-5.0	5.2
4	MAY	1980	400	125.166664	85.761844	-23.492487	-5.1	5.5
4	MAY	1980	456	125.205559	85.760384	-23.470226	-4.9	5.2
4	MAY	1980	500	125.208336	85.760277	-23.468721	-4.6	5.1
4	MAY	1980	600	125.250000	85.758743	-23.447830	-4.6	4.5
4	MAY	1980	644	125.240550	85.757675	-23.433350	-4.4	4.5
4	MAY	1980	700	125.291664	85.757294	-23.428045	-4.4	4.6
4	MAY	1980	800	125.333336	85.755852	-23.408175	-4.6	4.4
4	MAY	1980	831	125.354858	85.755056	-23.398718	-4.8	4.0
4	MAY	1980	900	125.375000	85.754288	-23.390795	-5.1	3.5
4	MAY	1980	1000	125.410000	85.752533	-23.377987	-5.7	2.3
4	MAY	1980	1018	125.429169	85.751958	-23.375229	-5.9	1.9

POSITIONS OF THE DRIFTING STATION CAMP I  
AS DETERMINED BY CELESTIAL NAVIGATION

<u>Fix Number</u>	<u>Date</u>		<u>GMT</u>	<u>Latitude</u>	<u>Longitude*</u>
1	Apr. 8	1980	1916	89.113	-9.00
2	9	1980	1057	89.105	-14.50
3	10	1980	1124	89.093	-14.00
4	11	1980	1148	89.100	-14.00
5	14	1980	1006	89.067	-14.50
6	15	1980	1434	89.073	-13.50
7	20	1980	2039	88.873	-16.75
8	21	1980	1402	88.958	-19.50
9	22	1980	1525	88.942	-18.50
10	23	1980	2359	88.828	-18.75
11	25	1980	1053	88.850	-18.75
12	28	1980	1608	88.753	-19.25
13	30	1980	2116	88.780	-17.50
14	May 2	1980	1300	88.880	-23.50

The fix number is placed next to the position indicator (+) on the following plot to aid in the interpretation of the Camp I drift track through time.

\*negative sign implies west longitude



## CAMP I ICE FLOE AZIMUTH, GRID AZIMUTH AND MAGNETIC DECLINATION

During the drift of Camp I, ice floe azimuths and magnetic declinations were taken when weather and time permitted. Markers positioned on the ice flow determined the imaginary line of the camp azimuth. Bearings of the camp azimuth relative to True North were determined using sun shots.

Magnetic declinations were obtained using a K & E surveyors compass placed in between and in line with the markers defining the line of the camp azimuth. The difference between the True North bearing of the camp azimuth and magnetic north reading from the surveyors compass is defined as the magnetic declination. Error estimates for magnetic declination are  $\pm 0.5$  degrees.

### Key to column headings:

Date and GMT are as previously noted

True Azimuth      degrees clockwise from True North with estimated error (also in decimal degrees)

Grid Azimuth      degrees clockwise from Grid North. Grid North is defined as any directed line parallel to the 0 degree meridian from Greenwich, England to the North Pole. Grid East is 90 degrees clockwise.

Magnetic  
Declination      decimal degrees, positive values imply west declinations

## CAMP I AZIMUTH AND DECLINATION

	<u>Date</u>	<u>GMT</u>	<u>True Azimuth</u>	<u>Grid Azimuth</u>	<u>Magnetic Declination</u>
April	8	1980	1916	17.9 $\pm$ 0.4	26.9
	9		1057	15.9 $\pm$ 0.2	27.4
	10		1124	15.9 $\pm$ 2.6	26.9
	11		1148	13.6 $\pm$ 0.1	27.6
	14		1006	13.5 $\pm$ 0.2	28.0
	15		1434	15.0 $\pm$ 0.5	28.5
	18		1107	15.0	40.5
	20		2039	12.7 $\pm$ 1.0	29.5
	21		1402	9.3 $\pm$ 0.1	28.8
	22		1525	10.4 $\pm$ 0.3	28.9
	23		2359	10.7 $\pm$ 0.1	29.5
	24		1300	10.8 $\pm$ 0.5	29.5
	25		1053	11.0 $\pm$ 0.1	29.8
	26		2207	10.3	29.3
	28		1608	9.2 $\pm$ 0.1	28.5
	30		2116	9.8 $\pm$ 0.1	27.3
May	2		1300	3.0	26.5
					42.0

### Depth Soundings

As FRAM II drifted, a continuous record of ocean depths was made with an echo sounder operating at a frequency of 12 kHz. The sounder was manufactured by the Edo Western Corp. and consisted of three units: Model D-100 transducer, Model 248E sonar transceiver and Model 550A graphic recorder. The instrument was installed through an open hydrographic well with the transducer suspended at a depth of 2 m below sea level. Depths for this report were scaled at hourly intervals from the chart records on which 19" represented a depth change of 1500 m. The actual physical measurement is two-way reflection time from the transducer to the bottom and return. The uncorrected depth is defined as the one-way reflection time multiplied by the nominal speed of sound in seawater, 1500 m/s. More precise depth determination requires a correction for the sound speed profile in particular geographic areas of the ocean. The corrected depths listed here are based on tables by Matthews (1939).

FRAM II drifted over the lower flanks of the Morris Jessup Plateau, a marginal continental feature north of Greenland. Depths ranged from 4036 m at the commencement of recording to 3650 m at the shallowest.

## OCEAN DEPTHS AT FRAM II

## Key to column headings:

DY = Day

MON = Month

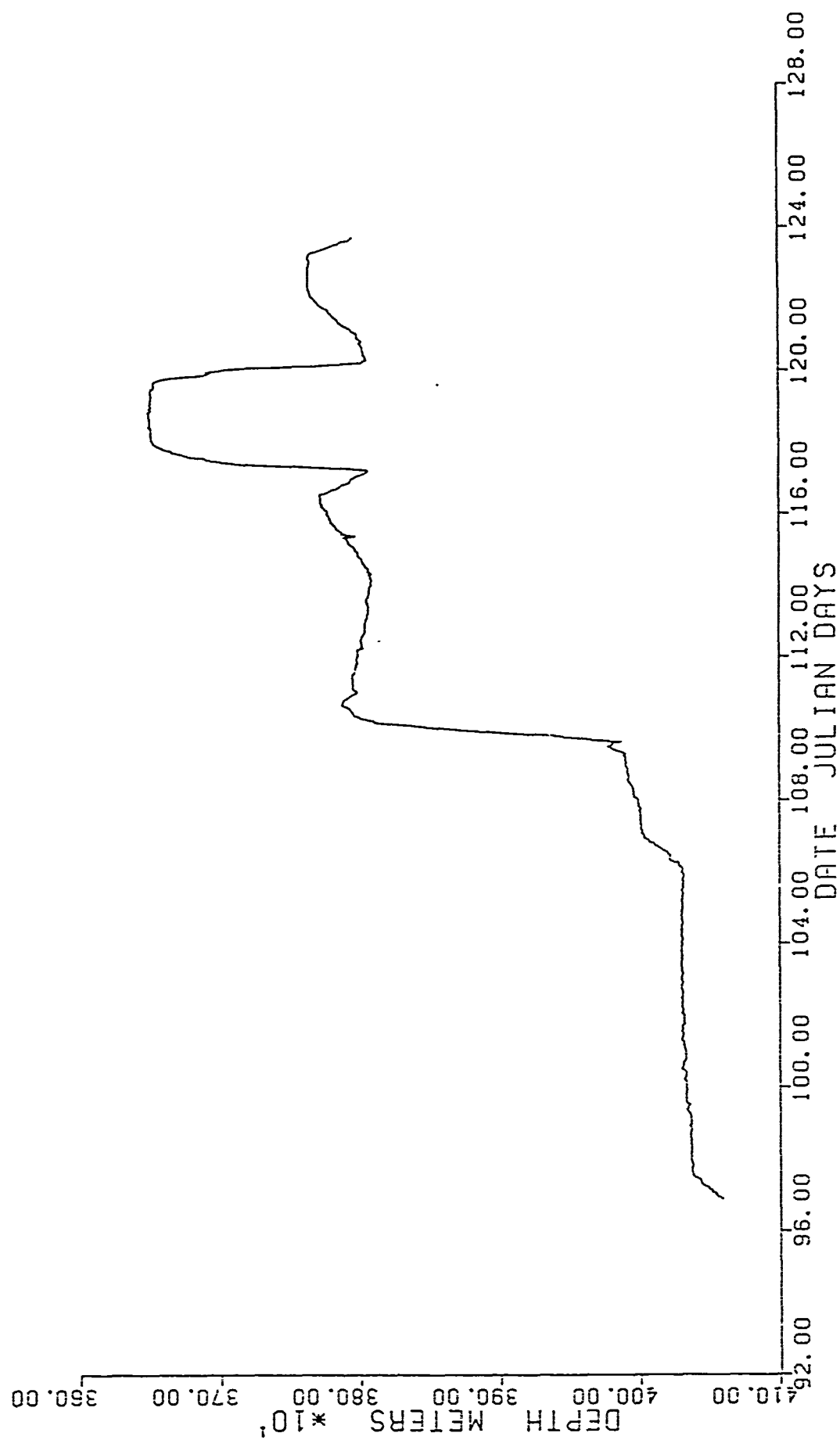
YEAR = Year

GMT = Greenwich Mean Time

SECONDS = Two-way reflection time

METERS (UNCORR) = Uncorrected depth based on sound  
speed of  $1500 \text{ m s}^{-1}$ VEL (CORR) = Depth correction for sound speed  
in Arctic waters (Matthews, 1939)METERS (CORR) = Corrected depths = METERS (UNCORR)  
+ VEL (CORR)





## FRA 2 DEPTH DATA

BY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
5	APR	1980	2100	5.490	4117.5	-58	4059.5
5	APR	1980	2200	5.488	4116.0	-58	4058.0
5	APR	1980	2300	5.485	4113.8	-58	4055.8
6	APR	1980	0	5.483	4112.3	-58	4054.3
6	APR	1980	100	5.484	4113.0	-58	4055.0
6	APR	1980	200	5.479	4109.3	-58	4051.3
6	APR	1980	300	5.480	4110.0	-58	4052.0
6	APR	1980	400	5.476	4107.0	-58	4049.0
6	APR	1980	500	5.476	4107.0	-58	4049.0
6	APR	1980	600	5.472	4104.0	-58	4046.0
6	APR	1980	700	5.470	4102.5	-58	4044.2
6	APR	1980	800	5.469	4101.8	-58	4043.8
6	APR	1980	900	5.468	4101.0	-58	4043.0
6	APR	1980	1000	5.466	4101.0	-58	4043.0
6	APR	1980	1100	5.465	4098.3	-58	4040.8
6	APR	1980	1200	5.462	4096.5	-58	4038.5
6	APR	1980	1300	5.461	4095.5	-58	4037.5
6	APR	1980	1400	5.461	4095.8	-58	4037.8
6	APR	1980	1500	5.460	4095.0	-58	4037.0
6	APR	1980	1600	5.460	4095.0	-58	4037.0
6	APR	1980	1700	5.460	4095.0	-58	4037.0
6	APR	1980	1800	5.460	4095.0	-58	4037.0
6	APR	1980	1900	5.461	4095.8	-58	4037.8
6	APR	1980	2000	5.461	4095.8	-58	4037.8
6	APR	1980	2100	5.460	4095.0	-58	4037.0
6	APR	1980	2200	5.460	4095.0	-58	4037.0
6	APR	1980	2300	5.459	4094.3	-58	4036.3
7	APR	1980	0	5.459	4094.3	-58	4036.3
7	APR	1980	100	5.459	4094.3	-58	4036.3
7	APR	1980	200	5.459	4095.0	-58	4037.0
7	APR	1980	300	5.459	4094.3	-58	4036.3
7	APR	1980	400	5.460	4095.0	-58	4037.0
7	APR	1980	500	5.460	4095.0	-58	4037.0
7	APR	1980	600	5.460	4095.0	-58	4037.0
7	APR	1980	700	5.460	4095.0	-58	4037.0
7	APR	1980	800	5.460	4095.0	-58	4037.0
7	APR	1980	900	5.460	4095.0	-58	4037.0
7	APR	1980	1000	5.459	4094.3	-58	4036.3
7	APR	1980	1100	5.459	4095.0	-58	4037.0
7	APR	1980	1200	5.464	4094.3	-58	4036.3
7	APR	1980	1300	5.460	4095.0	-58	4037.0
7	APR	1980	1400	5.461	4094.3	-58	4036.3
7	APR	1980	1500	5.464	4094.3	-58	4036.3
7	APR	1980	1600	5.464	4094.3	-58	4036.3
7	APR	1980	1700	5.464	4094.3	-58	4036.3
7	APR	1980	1800	5.464	4094.3	-58	4036.3
7	APR	1980	1900	5.460	4095.0	-58	4037.0
7	APR	1980	2000	5.460	4095.0	-58	4037.0
7	APR	1980	2100	5.460	4094.3	-58	4036.3
7	APR	1980	2200	5.464	4093.5	-58	4035.5
7	APR	1980	2300	5.460	4095.0	-58	4037.0
7	APR	1980	0	5.464	4094.3	-58	4036.3
7	APR	1980	100	5.464	4095.0	-58	4037.0
7	APR	1980	200	5.464	4094.3	-58	4036.3
7	APR	1980	300	5.464	4094.3	-58	4036.3
7	APR	1980	400	5.464	4094.3	-58	4036.3
7	APR	1980	500	5.464	4094.3	-58	4036.3
7	APR	1980	600	5.464	4094.3	-58	4036.3
7	APR	1980	700	5.464	4094.3	-58	4036.3
7	APR	1980	800	5.464	4094.3	-58	4036.3
7	APR	1980	900	5.464	4094.3	-58	4036.3
7	APR	1980	1000	5.464	4094.3	-58	4036.3
7	APR	1980	1100	5.464	4094.3	-58	4036.3
7	APR	1980	1200	5.464	4094.3	-58	4036.3
7	APR	1980	1300	5.464	4094.3	-58	4036.3
7	APR	1980	1400	5.464	4094.3	-58	4036.3
7	APR	1980	1500	5.464	4094.3	-58	4036.3
7	APR	1980	1600	5.464	4094.3	-58	4036.3

## FRA 4 2 DEPTH DATA

DY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CURR	METERS (CORR)
5	APR	1980	1700	5.455	4091.3		4033.3
8	APR	1980	1800	5.455	4091.3		4033.3
8	APR	1980	1900	5.455	4091.3		4033.3
8	APR	1980	2000	5.455	4091.3		4033.3
8	APR	1980	2100	5.455	4091.3		4033.3
8	APR	1980	2200	5.455	4092.0		4034.0
8	APR	1980	2300	5.455	4091.3		4033.3
9	APR	1980	0	5.455	4091.3		4033.3
9	APR	1980	100	5.455	4091.3		4033.3
9	APR	1980	200	5.455	4091.3		4033.3
9	APR	1980	300	5.455	4091.3		4033.3
9	APR	1980	400	5.455	4091.3		4033.3
9	APR	1980	500	5.452	4089.0		4031.8
9	APR	1980	600	5.454	4090.5		4032.5
9	APR	1980	700	5.455	4091.3		4033.3
9	APR	1980	800	5.455	4091.3		4033.3
9	APR	1980	900	5.455	4091.3		4033.3
9	APR	1980	1000	5.455	4091.3		4033.3
9	APR	1980	1100	5.453	4089.0		4031.8
9	APR	1980	1200	5.451	4088.3		4031.0
9	APR	1980	1300	5.452	4089.0		4031.0
9	APR	1980	1400	5.453	4089.8		4031.8
9	APR	1980	1500	5.453	4089.8		4031.8
9	APR	1980	1600	5.453	4089.8		4031.8
9	APR	1980	1700	5.454	4090.5		4032.5
9	APR	1980	1800	5.455	4091.3		4033.3
9	APR	1980	1900	5.455	4091.3		4033.3
9	APR	1980	2000	5.455	4091.3		4033.3
9	APR	1980	2100	5.455	4091.3		4033.3
9	APR	1980	2200	5.455	4091.3		4033.3
9	APR	1980	2300	5.455	4091.3		4033.3
10	APR	1980	0	5.455	4091.3		4033.3
10	APR	1980	100	5.454	4090.5		4032.5
10	APR	1980	200	5.454	4090.5		4032.5
10	APR	1980	300	5.453	4089.8		4031.8
10	APR	1980	400	5.453	4089.8		4031.8
10	APR	1980	500	5.452	4089.0		4031.0
10	APR	1980	600	5.451	4088.3		4031.0
10	APR	1980	700	5.451	4088.3		4031.0
10	APR	1980	800	5.452	4089.0		4031.0
10	APR	1980	900	5.452	4089.8		4031.8
10	APR	1980	1000	5.451	4088.3		4031.0
10	APR	1980	1100	5.452	4089.0		4031.0
10	APR	1980	1200	5.451	4088.3		4031.0
10	APR	1980	1300	5.452	4089.0		4031.0
10	APR	1980	1400	5.452	4089.8		4031.8
10	APR	1980	1500	5.452	4089.8		4031.8
10	APR	1980	1600	5.451	4088.3		4031.0
10	APR	1980	1700	5.452	4089.0		4031.0
10	APR	1980	1800	5.454	4090.5		4032.5
10	APR	1980	1900	5.453	4089.8		4031.8
10	APR	1980	2000	5.453	4089.8		4031.8
10	APR	1980	2100	5.452	4089.0		4031.0
10	APR	1980	2200	5.452	4089.8		4031.8
10	APR	1980	2300	5.452	4089.8		4031.8
11	APR	1980	0	5.452	4089.8		4031.8
11	APR	1980	100	5.451	4088.3		4031.0
11	APR	1980	200	5.452	4089.0		4031.0
11	APR	1980	300	5.452	4089.8		4031.8
11	APR	1980	400	5.452	4089.8		4031.8
11	APR	1980	500	5.451	4088.3		4031.0
11	APR	1980	600	5.451	4088.3		4031.0
11	APR	1980	700	5.452	4089.0		4031.0
11	APR	1980	800	5.452	4089.8		4031.8
11	APR	1980	900	5.452	4089.8		4031.8
11	APR	1980	1000	5.451	4088.3		4031.0
11	APR	1980	1100	5.452	4089.0		4031.0
11	APR	1980	1200	5.452	4089.8		4031.8
11	APR	1980	1300	5.452	4089.8		4031.8
11	APR	1980	1400	5.451	4088.3		4031.0
11	APR	1980	1500	5.452	4089.0		4031.0
11	APR	1980	1600	5.452	4089.8		4031.8
11	APR	1980	1700	5.452	4089.8		4031.8
11	APR	1980	1800	5.451	4088.3		4031.0
11	APR	1980	1900	5.452	4089.0		4031.0
11	APR	1980	2000	5.452	4089.8		4031.8
11	APR	1980	2100	5.452	4089.8		4031.8
11	APR	1980	2200	5.451	4088.3		4031.0
11	APR	1980	2300	5.452	4089.0		4031.0

# FRAM 2 DEPTH DATA

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DY	MON	YEAR	GHT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
11	APR	1980	1300	5.452	4089.0	-58	4031.0
11	APR	1980	1400	5.452	4089.0	-58	4031.0
11	APR	1980	1500	5.452	4089.0	-58	4031.0
11	APR	1980	1600	5.452	4089.0	-58	4031.0
11	APR	1980	1700	5.451	4088.3	-58	4030.3
11	APR	1980	1800	5.451	4088.3	-58	4030.3
11	APR	1980	1900	5.451	4088.3	-58	4030.3
11	APR	1980	2000	5.451	4088.3	-58	4030.3
11	APR	1980	2100	5.452	4089.0	-58	4031.0
11	APR	1980	2200	5.452	4089.0	-58	4031.0
11	APR	1980	2300	5.451	4088.3	-58	4030.3
12	APR	1980	0	5.451	4088.3	-58	4030.3
12	APR	1980	100	5.451	4088.3	-58	4030.3
12	APR	1980	200	5.451	4088.3	-58	4030.3
12	APR	1980	300	5.452	4089.0	-58	4031.0
12	APR	1980	400	5.452	4089.0	-58	4031.0
12	APR	1980	500	5.451	4088.3	-58	4030.3
12	APR	1980	600	5.451	4088.3	-58	4030.3
12	APR	1980	700	5.451	4088.3	-58	4030.3
12	APR	1980	800	5.451	4088.3	-58	4030.3
12	APR	1980	900	5.451	4088.3	-58	4030.3
12	APR	1980	1000	5.451	4088.3	-58	4030.3
12	APR	1980	1100	5.451	4088.3	-58	4030.3
12	APR	1980	1200	5.451	4088.3	-58	4030.3
12	APR	1980	1300	5.452	4089.0	-58	4031.0
12	APR	1980	1400	5.451	4088.3	-58	4030.3
12	APR	1980	1500	5.452	4089.0	-58	4031.0
12	APR	1980	1600	5.451	4088.3	-58	4030.3
12	APR	1980	1700	5.451	4088.3	-58	4030.3
12	APR	1980	1800	5.451	4088.3	-58	4030.3
12	APR	1980	1900	5.451	4088.3	-58	4030.3
12	APR	1980	2000	5.451	4088.3	-58	4030.3
12	APR	1980	2100	5.451	4088.3	-58	4030.3
12	APR	1980	2200	5.451	4088.3	-58	4030.3
12	APR	1980	2300	5.452	4089.0	-58	4031.0
13	APR	1980	0	5.451	4088.3	-58	4030.3
13	APR	1980	100	5.451	4088.3	-58	4030.3
13	APR	1980	200	5.452	4089.0	-58	4031.0
13	APR	1980	300	5.451	4088.3	-58	4030.3
13	APR	1980	400	5.451	4088.3	-58	4030.3
13	APR	1980	500	5.451	4088.3	-58	4030.3
13	APR	1980	600	5.451	4088.3	-58	4030.3
13	APR	1980	700	5.451	4088.3	-58	4030.3
13	APR	1980	800	5.451	4088.3	-58	4030.3
13	APR	1980	900	5.451	4088.3	-58	4030.3
13	APR	1980	1000	5.451	4088.3	-58	4030.3
13	APR	1980	1100	5.451	4088.3	-58	4030.3
13	APR	1980	1200	5.451	4088.3	-58	4030.3
13	APR	1980	1300	5.452	4089.0	-58	4031.0
13	APR	1980	1400	5.451	4088.3	-58	4030.3
13	APR	1980	1500	5.451	4088.3	-58	4030.3
13	APR	1980	1600	5.451	4088.3	-58	4030.3
13	APR	1980	1700	5.451	4088.3	-58	4030.3
13	APR	1980	1800	5.451	4088.3	-58	4030.3
13	APR	1980	1900	5.451	4088.3	-58	4030.3
13	APR	1980	2000	5.451	4088.3	-58	4030.3
13	APR	1980	2100	5.451	4088.3	-58	4030.3
13	APR	1980	2200	5.451	4088.3	-58	4030.3
13	APR	1980	2300	5.452	4089.0	-58	4031.0
14	APR	1980	0	5.452	4089.0	-58	4031.0
14	APR	1980	100	5.452	4089.0	-58	4031.0
14	APR	1980	200	5.452	4089.0	-58	4031.0
14	APR	1980	300	5.451	4088.3	-58	4030.3
14	APR	1980	400	5.452	4089.0	-58	4031.0
14	APR	1980	500	5.452	4089.0	-58	4031.0
14	APR	1980	600	5.452	4089.0	-58	4031.0
14	APR	1980	700	5.452	4089.0	-58	4031.0
14	APR	1980	800	5.452	4089.0	-58	4031.0
14	APR	1980	900	5.452	4089.0	-58	4031.0
14	APR	1980	1000	5.452	4089.0	-58	4031.0
14	APR	1980	1100	5.452	4089.0	-58	4031.0
14	APR	1980	1200	5.452	4089.0	-58	4031.0
14	APR	1980	1300	5.452	4089.0	-58	4031.0
14	APR	1980	1400	5.452	4089.0	-58	4031.0
14	APR	1980	1500	5.452	4089.0	-58	4031.0
14	APR	1980	1600	5.452	4089.0	-58	4031.0
14	APR	1980	1700	5.452	4089.0	-58	4031.0
14	APR	1980	1800	5.452	4089.0	-58	4031.0
14	APR	1980	1900	5.452	4089.0	-58	4031.0
14	APR	1980	2000	5.452	4089.0	-58	4031.0
14	APR	1980	2100	5.452	4089.0	-58	4031.0
14	APR	1980	2200	5.452	4089.0	-58	4031.0
14	APR	1980	2300	5.452	4089.0	-58	4031.0

## FRAM 2 DEPTH DATA

DT	407	YEAR	GAT	SECONDS	METERS (UNCORR)	WIND CORR	METERS (CORR)
14	APR	1950	900	5.453	4089.8	-	4031.6
14	APR	1950	1100	5.452	4089.9	-	4031.0
14	APR	1950	1100	5.451	4088.8	-	4030.3
14	APR	1950	1200	5.452	4088.9	-	4031.0
14	APR	1950	1300	5.453	4089.8	-	4031.8
14	APR	1950	1400	5.452	4088.8	-	4031.0
14	APR	1950	1500	5.453	4089.8	-	4031.6
14	APR	1950	1500	5.452	4089.8	-	4031.0
14	APR	1950	1700	5.453	4089.8	-	4031.8
14	APR	1950	1800	5.452	4089.8	-	4031.0
14	APR	1950	1900	5.452	4089.8	-	4031.0
14	APR	1950	2000	5.453	4089.8	-	4031.8
14	APR	1950	2100	5.453	4089.8	-	4031.8
14	APR	1950	2200	5.453	4089.8	-	4031.8
14	APR	1950	2300	5.451	4089.8	-	4030.3
15	APR	1950	0	5.452	4089.8	-	4031.6
15	APR	1950	100	5.452	4089.8	-	4031.6
15	APR	1950	200	5.452	4089.8	-	4031.6
15	APR	1950	300	5.450	4089.7	-	4029.5
15	APR	1950	400	5.448	4089.6	-	4028.0
15	APR	1950	500	5.449	4089.6	-	4028.8
15	APR	1950	600	5.449	4089.6	-	4028.9
15	APR	1950	700	5.443	4089.2	-	4024.3
15	APR	1950	800	5.440	4089.0	-	4022.0
15	APR	1950	900	5.440	4089.0	-	4022.0
15	APR	1950	1000	5.440	4089.0	-	4022.0
15	APR	1950	1100	5.441	4089.0	-	4022.8
15	APR	1950	1200	5.436	4079.8	-	4020.5
15	APR	1950	1300	5.436	4079.8	-	4020.5
15	APR	1950	1400	5.435	4079.8	-	4018.3
15	APR	1950	1500	5.432	4079.8	-	4019.0
15	APR	1950	1600	5.430	4079.2	-	4014.5
15	APR	1950	1700	5.428	4079.1	-	4013.0
15	APR	1950	1800	5.420	4069.8	-	4010.8
15	APR	1950	1900	5.420	4069.8	-	4010.8
15	APR	1950	2000	5.420	4069.8	-	4007.0
15	APR	1950	2100	5.420	4069.8	-	4007.0
15	APR	1950	2200	5.417	4069.8	-	4004.3
15	APR	1950	2300	5.413	4069.8	-	4004.3
15	APR	1950	0	5.410	4069.8	-	4003.8
15	APR	1950	100	5.410	4069.8	-	4001.1
15	APR	1950	200	5.413	4069.8	-	4001.1
15	APR	1950	300	5.413	4069.8	-	4001.1
15	APR	1950	400	5.414	4069.8	-	4001.1
15	APR	1950	500	5.414	4069.8	-	4001.1
15	APR	1950	600	5.413	4069.8	-	4001.1
15	APR	1950	700	5.412	4069.8	-	4001.1
15	APR	1950	800	5.412	4069.8	-	4001.1
15	APR	1950	900	5.412	4069.8	-	4001.1
15	APR	1950	1000	5.412	4069.8	-	4001.1
15	APR	1950	1100	5.412	4069.8	-	4001.1
15	APR	1950	1200	5.412	4069.8	-	4001.1
15	APR	1950	1300	5.412	4069.8	-	4001.1
15	APR	1950	1400	5.412	4069.8	-	4001.1
15	APR	1950	1500				
15	APR	1950	1600	5.413	4069.8	-	4001.1
15	APR	1950	1700	5.411	4069.8	-	4000.3
15	APR	1950	1800	5.411	4069.8	-	4000.3
15	APR	1950	1900	5.414	4069.8	-	4001.1
15	APR	1950	2000	5.412	4069.8	-	4001.1
15	APR	1950	2100	5.410	4069.8	-	4000.3
15	APR	1950	2200	5.411	4069.8	-	4000.3
15	APR	1950	2300	5.410	4069.8	-	4000.3
15	APR	1950	0	5.410	4069.8	-	4000.3
15	APR	1950	100	5.410	4069.8	-	4000.3
15	APR	1950	200	5.410	4069.8	-	4000.3
15	APR	1950	300	5.410	4069.8	-	4000.3
15	APR	1950	400	5.410	4069.8	-	4000.3
15	APR	1950	500	5.410	4069.8	-	4000.3
15	APR	1950	600	5.410	4069.8	-	4000.3
15	APR	1950	700	5.410	4069.8	-	4000.3
15	APR	1950	800	5.410	4069.8	-	4000.3
15	APR	1950	900	5.410	4069.8	-	4000.3
15	APR	1950	1000	5.410	4069.8	-	4000.3
15	APR	1950	1100	5.410	4069.8	-	4000.3
15	APR	1950	1200	5.410	4069.8	-	4000.3
15	APR	1950	1300	5.410	4069.8	-	4000.3
15	APR	1950	1400	5.410	4069.8	-	4000.3
15	APR	1950	1500	5.410	4069.8	-	4000.3
15	APR	1950	1600	5.410	4069.8	-	4000.3
15	APR	1950	1700	5.410	4069.8	-	4000.3
15	APR	1950	1800	5.410	4069.8	-	4000.3
15	APR	1950	1900	5.410	4069.8	-	4000.3
15	APR	1950	2000	5.410	4069.8	-	4000.3
15	APR	1950	2100	5.410	4069.8	-	4000.3
15	APR	1950	2200	5.410	4069.8	-	4000.3
15	APR	1950	2300	5.410	4069.8	-	4000.3
15	APR	1950	0	5.410	4069.8	-	4000.3
15	APR	1950	100	5.410	4069.8	-	4000.3
15	APR	1950	200	5.410	4069.8	-	4000.3
15	APR	1950	300	5.410	4069.8	-	4000.3
15	APR	1950	400	5.410	4069.8	-	4000.3
15	APR	1950	500	5.410	4069.8	-	4000.3
15	APR	1950	600	5.410	4069.8	-	4000.3
15	APR	1950	700	5.410	4069.8	-	4000.3
15	APR	1950	800	5.410	4069.8	-	4000.3
15	APR	1950	900	5.410	4069.8	-	4000.3
15	APR	1950	1000	5.410	4069.8	-	4000.3
15	APR	1950	1100	5.410	4069.8	-	4000.3
15	APR	1950	1200	5.410	4069.8	-	4000.3
15	APR	1950	1300	5.410	4069.8	-	4000.3
15	APR	1950	1400	5.410	4069.8	-	4000.3
15	APR	1950	1500	5.410	4069.8	-	4000.3
15	APR	1950	1600	5.410	4069.8	-	4000.3
15	APR	1950	1700	5.410	4069.8	-	4000.3
15	APR	1950	1800	5.410	4069.8	-	4000.3
15	APR	1950	1900	5.410	4069.8	-	4000.3
15	APR	1950	2000	5.410	4069.8	-	4000.3
15	APR	1950	2100	5.410	4069.8	-	4000.3
15	APR	1950	2200	5.410	4069.8	-	4000.3
15	APR	1950	2300	5.410	4069.8	-	4000.3
15	APR	1950	0	5.410	4069.8	-	4000.3
15	APR	1950	100	5.410	4069.8	-	4000.3
15	APR	1950	200	5.410	4069.8	-	4000.3
15	APR	1950	300	5.410	4069.8	-	4000.3
15	APR	1950	400	5.410	4069.8	-	4000.3
15	APR	1950	500	5.410	4069.8	-	4000.3
15	APR	1950	600	5.410	4069.8	-	4000.3
15	APR	1950	700	5.410	4069.8	-	4000.3
15	APR	1950	800	5.410	4069.8	-	4000.3
15	APR	1950	900	5.410	4069.8	-	4000.3
15	APR	1950	1000	5.410	4069.8	-	4000.3
15	APR	1950	1100	5.410	4069.8	-	4000.3
15	APR	1950	1200	5.410	4069.8	-	4000.3
15	APR	1950	1300	5.410	4069.8	-	4000.3
15	APR	1950	1400	5.410	4069.8	-	4000.3
15	APR	1950	1500	5.410	4069.8	-	4000.3
15	APR	1950	1600	5.410	4069.8	-	4000.3
15	APR	1950	1700	5.410	4069.8	-	4000.3
15	APR	1950	1800	5.410	4069.8	-	4000.3
15	APR	1950	1900	5.410	4069.8	-	4000.3
15	APR	1950	2000	5.410	4069.8	-	4000.3
15	APR	1950	2100	5.410	4069.8	-	4000.3
15	APR	1950	2200	5.410	4069.8	-	4000.3
15	APR	1950	2300	5.410	4069.8	-	4000.3
15	APR	1950	0	5.410	4069.8	-	4000.3
15	APR	1950	100	5.410	4069.8	-	4000.3
15	APR	1950	200	5.410	4069.8	-	4000.3
15	APR	1950	300	5.410	4069.8	-	4000.3
15	APR	1950	400	5.410	4069.8	-	4000.3
15	APR	1950	500	5.410	4069.8	-	4000.3
15	APR	1950	600	5.410	4069.8	-	4000.3
15	APR	1950	700	5.410	4069.8	-	4000.3
15	APR	1950	800	5.410	4069.8	-	4000.3
15	APR	1950	900	5.410	4069.8	-	4000.3
15	APR	1950	1000	5.410	4069.8	-	4000.3
15	APR	1950	1100	5.410	4069.8	-	4000.3
15	APR	1950	1200	5.410	4069.8	-	4000.3
15	APR	1950	1300	5.410	4069.8	-	4000.3
15	APR	1950	1400	5.410	4069.8	-	4000.3
15	APR	1950	1500	5.410	4069.8	-	4000.3
15	APR	1950	1600	5.410	4069.8	-	4000.3
15	APR	1950	1700	5.410	4069.8	-	4000.3
15	APR	1950	1800	5.410	4069.8	-	4000.3
15	APR	1950	1900	5.410	4069.8	-	4000.3
15	APR	1950	2000	5.410	4069.8	-	4000.3
15	APR	1950	2100	5.410	4069.8	-	4000.3
15	APR	1950	2200	5.410	4069.8	-	4000.3
15	APR	1950	2300	5.410	4069.8	-	4000.3
15	APR	1950	0	5.410	4069.8	-	4000.3
15	APR	1950	100	5.410	4069.8	-	4000.3
15	APR	1950	200	5.410	4069.8	-	4000.3
15	APR	1950	300	5.410	4069.8	-	4000.3
15	APR	1950	400	5.410	4069.8	-	4000.3
15	APR	1950	500	5.410	4069.8	-	4000.3
15	APR	1950	600	5.410	4069.8	-	4000.3
15	APR	1950	700	5.410	4069.8	-	4000.3
15	APR	1950	800	5.410	4069.8	-	4000.3
15	APR	1950	900	5.410	4069.8	-	4000.3
15	APR	1950	1000	5.410	4069.8	-	4000.3
15</							

BY	FOR	YEAR	GAT	SECONDS	METERS (CORR)	VEL CORR	METERS (CORR)
17	APR	1980	500	5.405	40534.5	1	3995
17	APR	1980	500	5.405	40533.5	1	3995
17	APR	1980	700	5.405	40533.5	1	3995
17	APR	1980	800	5.405	40533.5	1	3995
17	APR	1980	900	5.404	40533.5	1	3995
17	APR	1980	1000	5.403	40529.5	1	3995
17	APR	1980	1100	5.402	40521.5	1	3995
17	APR	1980	1200	5.401	40520.5	1	3995
17	APR	1980	1300	5.400	40520.5	1	3995
17	APR	1980	1400	5.400	40520.5	1	3995
17	APR	1980	1500	5.401	40520.5	1	3995
17	APR	1980	1500	5.401	40520.5	1	3995
17	APR	1980	1700	5.400	40520.5	1	3995
17	APR	1980	1800	5.400	40520.5	1	3995
17	APR	1980	1900	5.400	40520.5	1	3995
17	APR	1980	1900	5.400	40520.5	1	3995
17	APR	1980	2000	5.400	40520.5	1	3995
17	APR	1980	2100	5.400	40520.5	1	3995
17	APR	1980	2100	5.399	40520.5	1	3995
17	APR	1980	2200	5.399	40520.5	1	3995
17	APR	1980	2300	5.399	40520.5	1	3995
17	APR	1980	2400	5.399	40520.5	1	3995
17	APR	1980	2500	5.399	40520.5	1	3995
17	APR	1980	2600	5.399	40520.5	1	3995
17	APR	1980	2700	5.399	40520.5	1	3995
17	APR	1980	2800	5.399	40520.5	1	3995
17	APR	1980	2900	5.399	40520.5	1	3995
17	APR	1980	3000	5.399	40520.5	1	3995
17	APR	1980	3100	5.399	40520.5	1	3995
17	APR	1980	3200	5.399	40520.5	1	3995
17	APR	1980	3300	5.399	40520.5	1	3995
17	APR	1980	3400	5.399	40520.5	1	3995
17	APR	1980	3500	5.399	40520.5	1	3995
17	APR	1980	3600	5.399	40520.5	1	3995
17	APR	1980	3700	5.399	40520.5	1	3995
17	APR	1980	3800	5.399	40520.5	1	3995
17	APR	1980	3900	5.399	40520.5	1	3995
17	APR	1980	4000	5.399	40520.5	1	3995
17	APR	1980	4100	5.399	40520.5	1	3995
17	APR	1980	4200	5.399	40520.5	1	3995
17	APR	1980	4300	5.399	40520.5	1	3995
17	APR	1980	4400	5.399	40520.5	1	3995
17	APR	1980	4500	5.399	40520.5	1	3995
17	APR	1980	4600	5.399	40520.5	1	3995
17	APR	1980	4700	5.399	40520.5	1	3995
17	APR	1980	4800	5.399	40520.5	1	3995
17	APR	1980	4900	5.399	40520.5	1	3995
17	APR	1980	5000	5.399	40520.5	1	3995
17	APR	1980	5100	5.399	40520.5	1	3995
17	APR	1980	5200	5.399	40520.5	1	3995
17	APR	1980	5300	5.399	40520.5	1	3995
17	APR	1980	5400	5.399	40520.5	1	3995
17	APR	1980	5500	5.399	40520.5	1	3995
17	APR	1980	5600	5.399	40520.5	1	3995
17	APR	1980	5700	5.399	40520.5	1	3995
17	APR	1980	5800	5.399	40520.5	1	3995
17	APR	1980	5900	5.399	40520.5	1	3995
17	APR	1980	6000	5.399	40520.5	1	3995
17	APR	1980	6100	5.399	40520.5	1	3995
17	APR	1980	6200	5.399	40520.5	1	3995
17	APR	1980	6300	5.399	40520.5	1	3995
17	APR	1980	6400	5.399	40520.5	1	3995
17	APR	1980	6500	5.399	40520.5	1	3995
17	APR	1980	6600	5.399	40520.5	1	3995
17	APR	1980	6700	5.399	40520.5	1	3995
17	APR	1980	6800	5.399	40520.5	1	3995
17	APR	1980	6900	5.399	40520.5	1	3995
17	APR	1980	7000	5.399	40520.5	1	3995
17	APR	1980	7100	5.399	40520.5	1	3995
17	APR	1980	7200	5.399	40520.5	1	3995
17	APR	1980	7300	5.399	40520.5	1	3995
17	APR	1980	7400	5.399	40520.5	1	3995
17	APR	1980	7500	5.399	40520.5	1	3995
17	APR	1980	7600	5.399	40520.5	1	3995
17	APR	1980	7700	5.399	40520.5	1	3995
17	APR	1980	7800	5.399	40520.5	1	3995
17	APR	1980	7900	5.399	40520.5	1	3995
17	APR	1980	8000	5.399	40520.5	1	3995
17	APR	1980	8100	5.399	40520.5	1	3995
17	APR	1980	8200	5.399	40520.5	1	3995
17	APR	1980	8300	5.399	40520.5	1	3995
17	APR	1980	8400	5.399	40520.5	1	3995
17	APR	1980	8500	5.399	40520.5	1	3995
17	APR	1980	8600	5.399	40520.5	1	3995
17	APR	1980	8700	5.399	40520.5	1	3995
17	APR	1980	8800	5.399	40520.5	1	3995
17	APR	1980	8900	5.399	40520.5	1	3995
17	APR	1980	9000	5.399	40520.5	1	3995
17	APR	1980	9100	5.399	40520.5	1	3995
17	APR	1980	9200	5.399	40520.5	1	3995
17	APR	1980	9300	5.399	40520.5	1	3995
17	APR	1980	9400	5.399	40520.5	1	3995
17	APR	1980	9500	5.399	40520.5	1	3995
17	APR	1980	9600	5.399	40520.5	1	3995
17	APR	1980	9700	5.399	40520.5	1	3995
17	APR	1980	9800	5.399	40520.5	1	3995
17	APR	1980	9900	5.399	40520.5	1	3995
17	APR	1980	10000	5.399	40520.5	1	3995

## FRA 1 2 DEPTH DATA

DY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
20	APR	1980	100	5.144	38558.0	1.59	3799.0
20	APR	1980	200	5.141	38555.8	1.59	3796.8
20	APR	1980	300	5.140	38555.0	1.59	3796.0
20	APR	1980	400	5.140	38555.0	1.59	3796.0
20	APR	1980	500	5.140	38555.0	1.59	3796.0
20	APR	1980	600	5.140	38555.0	1.59	3796.0
20	APR	1980	700	5.140	38555.0	1.59	3796.0
20	APR	1980	800	5.140	38555.0	1.59	3796.0
20	APR	1980	900	5.140	38555.0	1.59	3796.0
20	APR	1980	1000	5.140	38555.0	1.59	3796.0
20	APR	1980	1100	5.140	38555.0	1.59	3796.0
20	APR	1980	1200	5.141	38555.8	1.59	3796.8
20	APR	1980	1300	5.142	38556.5	1.59	3797.5
20	APR	1980	1400	5.142	38556.5	1.59	3797.5
20	APR	1980	1500	5.143	38557.3	1.59	3798.3
20	APR	1980	1600	5.143	38557.3	1.59	3798.3
20	APR	1980	1700	5.143	38557.3	1.59	3798.3
20	APR	1980	1800	5.144	38558.0	1.59	3799.0
20	APR	1980	1900	5.143	38557.3	1.59	3798.3
20	APR	1980	2000	5.145	38558.8	1.59	3799.8
20	APR	1980	2100	5.144	38558.0	1.59	3799.0
20	APR	1980	2200	5.144	38558.0	1.59	3799.0
20	APR	1980	2300	5.144	38558.0	1.59	3799.0
21	APR	1980	0	5.145	38558.8	1.59	3799.8
21	APR	1980	100	5.145	38558.8	1.59	3799.8
21	APR	1980	200	5.145	38558.8	1.59	3799.8
21	APR	1980	300	5.145	38558.8	1.59	3799.8
21	APR	1980	400	5.145	38558.8	1.59	3799.8
21	APR	1980	500	5.145	38558.8	1.59	3799.8
21	APR	1980	600	5.150	38559.2	1.59	3800.2
21	APR	1980	700	5.148	38559.1	1.59	3800.2
21	APR	1980	800	5.149	38559.8	1.59	3800.8
21	APR	1980	900	5.149	38559.8	1.59	3800.8
21	APR	1980	1000	5.148	38559.1	1.59	3800.2
21	APR	1980	1100	5.148	38559.1	1.59	3800.2
21	APR	1980	1200	5.149	38559.8	1.59	3800.8
21	APR	1980	1300	5.149	38559.8	1.59	3800.8
21	APR	1980	1400	5.150	38560.2	1.59	3801.2
21	APR	1980	1500	5.151	38560.9	1.59	3801.9
21	APR	1980	1600	5.152	38561.6	1.59	3802.6
21	APR	1980	1700	5.152	38561.6	1.59	3802.6
21	APR	1980	1800	5.152	38561.6	1.59	3802.6
21	APR	1980	1900	5.152	38561.6	1.59	3802.6
21	APR	1980	2000	5.152	38561.6	1.59	3802.6
21	APR	1980	2100	5.152	38561.6	1.59	3802.6
21	APR	1980	2200	5.152	38561.6	1.59	3802.6
21	APR	1980	2300	5.152	38561.6	1.59	3802.6
22	APR	1980	0	5.153	38562.4	1.59	3803.4
22	APR	1980	100	5.153	38562.4	1.59	3803.4
22	APR	1980	200	5.154	38563.1	1.59	3804.1
22	APR	1980	300	5.154	38563.1	1.59	3804.1
22	APR	1980	400	5.154	38563.1	1.59	3804.1
22	APR	1980	500	5.155	38563.8	1.59	3804.8
22	APR	1980	600	5.155	38563.8	1.59	3804.8
22	APR	1980	700	5.155	38563.8	1.59	3804.8
22	APR	1980	800	5.155	38563.8	1.59	3804.8
22	APR	1980	900	5.155	38563.8	1.59	3804.8
22	APR	1980	1000	5.156	38564.5	1.59	3805.5
22	APR	1980	1100	5.156	38564.5	1.59	3805.5
22	APR	1980	1200	5.156	38564.5	1.59	3805.5
22	APR	1980	1300	5.156	38564.5	1.59	3805.5
22	APR	1980	1400	5.156	38564.5	1.59	3805.5
22	APR	1980	1500	5.156	38564.5	1.59	3805.5
22	APR	1980	1600	5.156	38564.5	1.59	3805.5
22	APR	1980	1700	5.155	38563.8	1.59	3804.8
22	APR	1980	1800	5.155	38563.8	1.59	3804.8
22	APR	1980	1900	5.155	38563.8	1.59	3804.8
22	APR	1980	2000	5.155	38563.8	1.59	3804.8
22	APR	1980	2100	5.155	38563.8	1.59	3804.8
22	APR	1980	2200	5.155	38563.8	1.59	3804.8
22	APR	1980	2300	5.155	38563.8	1.59	3804.8

## FRAM 2 DEPTH DATA

DY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CURR	METERS (CURR)
22	APR	1980	2100	5.156	3867.0	-159	3808.0
22	APR	1980	2200	5.156	3867.0	-159	3808.0
22	APR	1980	2300	5.156	3867.0	-159	3808.0
23	APR	1980	0	5.158	3868.5	-159	3809.5
23	APR	1980	100	5.157	3867.8	-159	3808.8
23	APR	1980	200	5.157	3867.8	-159	3808.8
23	APR	1980	300	5.158	3868.5	-159	3809.5
23	APR	1980	400	5.158	3868.5	-159	3809.5
23	APR	1980	500	5.157	3867.8	-159	3808.8
23	APR	1980	600	5.157	3867.8	-159	3808.8
23	APR	1980	700	5.156	3867.0	-159	3808.0
23	APR	1980	800	5.158	3868.5	-159	3809.5
23	APR	1980	900	5.155	3866.3	-159	3807.3
23	APR	1980	1000	5.155	3866.3	-159	3807.3
23	APR	1980	1100	5.155	3866.3	-159	3807.3
23	APR	1980	1200	5.153	3864.8	-159	3805.5
23	APR	1980	1300	5.152	3864.0	-159	3805.5
23	APR	1980	1400	5.151	3863.3	-159	3804.3
23	APR	1980	1500	5.150	3862.5	-159	3803.5
23	APR	1980	1600	5.149	3861.8	-159	3802.8
23	APR	1980	1700	5.149	3861.8	-159	3802.8
23	APR	1980	1800	5.148	3861.0	-159	3802.0
23	APR	1980	1900	5.146	3859.5	-159	3800.5
23	APR	1980	2000	5.145	3858.8	-159	3799.8
23	APR	1980	2100	5.145	3858.8	-159	3799.8
23	APR	1980	2200	5.145	3858.8	-159	3799.8
23	APR	1980	2300	5.143	3857.3	-159	3798.3
24	APR	1980	0	5.142	3856.5	-159	3797.5
24	APR	1980	100	5.142	3855.5	-159	3797.5
24	APR	1980	200	5.140	3855.0	-159	3796.0
24	APR	1980	300	5.138	3853.5	-159	3794.5
24	APR	1980	400	5.136	3852.0	-159	3793.0
24	APR	1980	500	5.136	3852.0	-159	3793.0
24	APR	1980	600	5.135	3851.3	-159	3792.3
24	APR	1980	700	5.134	3850.5	-159	3791.5
24	APR	1980	800	5.133	3849.8	-159	3789.8
24	APR	1980	900	5.132	3849.0	-159	3789.0
24	APR	1980	1000	5.131	3848.3	-159	3788.3
24	APR	1980	1100	5.131	3848.3	-159	3788.3
24	APR	1980	1200	5.130	3847.5	-159	3787.5
24	APR	1980	1300	5.128	3845.0	-159	3785.0
24	APR	1980	1400	5.126	3844.5	-159	3784.5
24	APR	1980	1500	5.126	3844.5	-159	3784.5
24	APR	1980	1600	5.124	3843.0	-159	3783.0
24	APR	1980	1700	5.123	3842.3	-159	3782.3
24	APR	1980	1800	5.121	3840.5	-159	3780.5
24	APR	1980	1900	5.121	3840.5	-159	3780.5
24	APR	1980	2000	5.120	3840.0	-159	3780.0
24	APR	1980	2100	5.120	3840.0	-159	3780.0
24	APR	1980	2200	5.119	3839.5	-159	3779.5
24	APR	1980	2300	5.118	3838.5	-159	3778.5
25	APR	1980	0	5.117	3837.8	-159	3777.8
25	APR	1980	100	5.116	3836.8	-159	3776.8
25	APR	1980	200	5.115	3835.5	-159	3775.5
25	APR	1980	300	5.114	3834.5	-159	3774.5
25	APR	1980	400	5.112	3834.0	-159	3774.0
25	APR	1980	500	5.113	3834.0	-159	3774.0
25	APR	1980	600	5.111	3833.0	-159	3773.0
25	APR	1980	700	5.111	3833.0	-159	3773.0
25	APR	1980	800	5.111	3833.0	-159	3773.0
25	APR	1980	900	5.111	3833.0	-159	3773.0
25	APR	1980	1000	5.111	3833.0	-159	3773.0
25	APR	1980	1100	5.111	3833.0	-159	3773.0
25	APR	1980	1200	5.111	3833.0	-159	3773.0
25	APR	1980	1300	5.113	3833.0	-159	3773.0
25	APR	1980	1400	5.117	3837.0	-159	3777.0
25	APR	1980	1500	5.120	3840.0	-159	3780.0
25	APR	1980	1600	5.123	3842.3	-159	3782.3



## FRAM 2 DEPTH DATA

DY	MON	YEAR	GMT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
25	APR	1980	1700	5.128	3846.0	-60	3786.0
25	APR	1980	1800	5.130	3847.5	-60	3787.5
25	APR	1980	1900	5.132	3849.0	-60	3789.0
25	APR	1980	2000	5.135	3851.3	-59	3792.3
25	APR	1980	2100	5.138	3853.5	-59	3794.5
25	APR	1980	2200	5.139	3854.6	-59	3795.3
25	APR	1980	2300	5.140	3855.6	-59	3796.0
26	APR	1980	0	5.143	3857.3	-59	3798.3
26	APR	1980	100	5.144	3858.0	-59	3799.0
26	APR	1980	200	5.149	3861.8	-59	3802.8
26	APR	1980	300	5.152	3864.0	-59	3805.0
26	APR	1980	400	5.155	3866.3	-59	3807.3
26	APR	1980	500	5.155	3866.3	-59	3807.3
26	APR	1980	600	5.139	3854.3	-59	3795.3
26	APR	1980	700	5.111	3833.3	-60	3773.3
26	APR	1980	800	5.080	3810.0	-60	3750.0
26	APR	1980	900	5.039	3779.3	-60	3719.3
26	APR	1980	1000	5.021	3755.8	-60	3705.8
26	APR	1980	1100	5.013	3759.8	-60	3699.8
26	APR	1980	1200	5.002	3751.5	-60	3691.5
26	APR	1980	1300	5.001	3750.4	-60	3690.4
26	APR	1980	1400	4.987	3740.3	-60	3680.3
26	APR	1980	1500	4.982	3736.5	-60	3676.5
26	APR	1980	1600	4.977	3732.8	-60	3672.8
26	APR	1980	1700	4.969	3726.8	-60	3666.8
26	APR	1980	1800	4.969	3726.8	-60	3666.8
26	APR	1980	1900	4.962	3721.5	-60	3661.5
26	APR	1980	2000	4.960	3720.0	-60	3660.0
26	APR	1980	2100	4.956	3717.0	-60	3657.0
26	APR	1980	2200	4.953	3714.6	-60	3654.6
26	APR	1980	2300	4.951	3713.3	-60	3653.3
27	APR	1980	0	4.951	3713.3	-60	3653.3
27	APR	1980	100	4.950	3712.5	-60	3652.5
27	APR	1980	200	4.950	3712.5	-60	3652.5
27	APR	1980	300	4.950	3712.5	-60	3652.5
27	APR	1980	400	4.950	3712.5	-60	3652.5
27	APR	1980	500	4.950	3712.5	-60	3652.5
27	APR	1980	600	4.950	3712.5	-60	3652.5
27	APR	1980	700	4.950	3712.5	-60	3652.5
27	APR	1980	800	4.950	3712.5	-60	3652.5
27	APR	1980	900	4.950	3712.5	-60	3652.5
27	APR	1980	1000	4.948	3711.0	-60	3651.0
27	APR	1980	1100	4.944	3711.3	-60	3651.3
27	APR	1980	1200	4.944	3711.3	-60	3651.3
27	APR	1980	1300	4.944	3711.3	-60	3651.3
27	APR	1980	1400	4.944	3711.3	-60	3651.3
27	APR	1980	1500	4.944	3711.3	-60	3651.3
27	APR	1980	1600	4.946	3711.0	-60	3651.0
27	APR	1980	1700	4.946	3711.0	-60	3651.0
27	APR	1980	1800	4.946	3711.0	-60	3651.0
27	APR	1980	1900	4.946	3711.0	-60	3651.0
27	APR	1980	2000	4.947	3710.3	-60	3650.3
27	APR	1980	2100	4.950	3712.5	-60	3652.5
27	APR	1980	2200	4.948	3711.0	-60	3651.0
27	APR	1980	2300	4.950	3712.5	-60	3652.5
28	APR	1980	0	4.949	3711.8	-60	3651.8
28	APR	1980	100	4.949	3711.8	-60	3651.8
28	APR	1980	200	4.950	3712.5	-60	3652.5
28	APR	1980	300	4.944	3711.3	-60	3651.3
28	APR	1980	400	4.950	3712.5	-60	3652.5
28	APR	1980	500	4.950	3712.5	-60	3652.5
28	APR	1980	600	4.950	3712.5	-60	3652.5
28	APR	1980	700	4.950	3712.5	-60	3652.5
28	APR	1980	800	4.950	3712.5	-60	3652.5
28	APR	1980	900	4.944	3711.3	-60	3651.3
28	APR	1980	1000	4.950	3712.5	-60	3652.5
28	APR	1980	1100	4.950	3712.5	-60	3652.5
28	APR	1980	1200	4.953	3714.8	-60	3654.8

## FRAM 2 DEPTH DATA

DAY	MON	YEAR	GIT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
28	APR	1980	1300	4.953	3714.8	-1.00	3654.8
28	APR	1980	1400	4.953	3714.8	-1.00	3654.8
28	APR	1980	1500	4.953	3714.8	-1.00	3654.8
28	APR	1980	1600	4.953	3714.8	-1.00	3654.8
28	APR	1980	1700	4.953	3716.3	-1.00	3660.0
28	APR	1980	1800	4.960	3720.0	-1.00	3666.3
28	APR	1980	1900	4.967	3725.3	-1.00	3674.3
28	APR	1980	2000	4.979	3734.3	-1.00	3690.0
28	APR	1980	2100	5.000	3750.0	-1.00	3694.5
28	APR	1980	2200	5.000	3754.5	-1.00	3692.5
28	APR	1980	2300	5.003	3752.5	-1.00	3700.0
28	APR	1980	0	5.014	3760.0	-1.00	3707.5
29	APR	1980	0	5.023	3767.3	-1.00	3727.5
29	APR	1980	100	5.030	3787.5	-1.00	3755.0
29	APR	1980	200	5.100	3825.0	-1.00	3786.0
29	APR	1980	300	5.125	3845.0	-1.00	3803.5
29	APR	1980	400	5.130	3860.0	-1.00	3820.0
29	APR	1980	500	5.151	3880.0	-1.00	3840.0
29	APR	1980	600	5.154	3885.0	-1.00	3845.0
29	APR	1980	700	5.153	3884.0	-1.00	3845.0
29	APR	1980	800	5.153	3884.0	-1.00	3845.0
29	APR	1980	900	5.151	3883.0	-1.00	3844.0
29	APR	1980	1000	5.151	3883.0	-1.00	3844.0
29	APR	1980	1100	5.151	3883.0	-1.00	3844.0
29	APR	1980	1200	5.150	3882.0	-1.00	3843.0
29	APR	1980	1300	5.150	3882.0	-1.00	3843.0
29	APR	1980	1400	5.150	3882.0	-1.00	3843.0
29	APR	1980	1500	5.149	3881.0	-1.00	3842.0
29	APR	1980	1600	5.147	3880.0	-1.00	3842.0
29	APR	1980	1700	5.147	3880.0	-1.00	3842.0
29	APR	1980	1800	5.146	3880.0	-1.00	3842.0
29	APR	1980	1900	5.146	3880.0	-1.00	3842.0
29	APR	1980	2000	5.146	3880.0	-1.00	3842.0
29	APR	1980	2100	5.145	3880.0	-1.00	3842.0
29	APR	1980	2200	5.145	3880.0	-1.00	3842.0
29	APR	1980	2300	5.145	3880.0	-1.00	3842.0
30	APR	1980	0	5.145	3880.0	-1.00	3842.0
30	APR	1980	100	5.143	3880.0	-1.00	3842.0
30	APR	1980	200	5.143	3880.0	-1.00	3842.0
30	APR	1980	300	5.139	3880.0	-1.00	3842.0
30	APR	1980	400	5.137	3880.0	-1.00	3842.0
30	APR	1980	500	5.134	3880.0	-1.00	3842.0
30	APR	1980	600	5.132	3880.0	-1.00	3842.0
30	APR	1980	700	5.131	3880.0	-1.00	3842.0
30	APR	1980	800	5.129	3880.0	-1.00	3842.0
30	APR	1980	900	5.128	3880.0	-1.00	3842.0
30	APR	1980	1000	5.127	3880.0	-1.00	3842.0
30	APR	1980	1100	5.125	3880.0	-1.00	3842.0
30	APR	1980	1200	5.123	3880.0	-1.00	3842.0
30	APR	1980	1300	5.122	3880.0	-1.00	3842.0
30	APR	1980	1400	5.121	3880.0	-1.00	3842.0
30	APR	1980	1500	5.119	3880.0	-1.00	3842.0
30	APR	1980	1600	5.117	3880.0	-1.00	3842.0
30	APR	1980	1700	5.117	3880.0	-1.00	3842.0
30	APR	1980	1800	5.114	3880.0	-1.00	3842.0
30	APR	1980	1900	5.112	3880.0	-1.00	3842.0
30	APR	1980	2000	5.110	3880.0	-1.00	3842.0
30	APR	1980	2100	5.107	3880.0	-1.00	3842.0
30	APR	1980	2200	5.106	3880.0	-1.00	3842.0
30	APR	1980	2300	5.105	3880.0	-1.00	3842.0
1	MAY	1980	0	5.103	3880.0	-1.00	3842.0
1	MAY	1980	100	5.102	3880.0	-1.00	3842.0
1	MAY	1980	200	5.102	3880.0	-1.00	3842.0
1	MAY	1980	300	5.101	3880.0	-1.00	3842.0
1	MAY	1980	400	5.101	3880.0	-1.00	3842.0
1	MAY	1980	500	5.100	3880.0	-1.00	3842.0
1	MAY	1980	600	5.100	3880.0	-1.00	3842.0
1	MAY	1980	700	5.100	3880.0	-1.00	3842.0
1	MAY	1980	800	5.100	3880.0	-1.00	3842.0

## FRAM 2 DEPTH DATA

DY	MON	YEAR	GMT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
1	MAY	1980	900	5.100	3825.0	-60	3765.0
1	MAY	1980	1000	5.100	3825.0	-60	3765.0
1	MAY	1980	1100	5.100	3825.0	-60	3765.0
1	MAY	1980	1200	5.100	3825.0	-60	3765.0
1	MAY	1980	1300	5.100	3825.0	-60	3765.0
1	MAY	1980	1400	5.100	3825.0	-60	3765.0
1	MAY	1980	1500	5.100	3825.0	-60	3765.0
1	MAY	1980	1600	5.100	3825.0	-60	3765.0
1	MAY	1980	1700	5.100	3825.0	-60	3765.0
1	MAY	1980	1800	5.100	3825.0	-60	3765.0
1	MAY	1980	1900	5.100	3825.0	-60	3765.0
1	MAY	1980	2000	5.100	3825.0	-60	3765.0
1	MAY	1980	2100	5.100	3825.0	-60	3765.0
1	MAY	1980	2200	5.101	3825.8	-60	3765.8
1	MAY	1980	2300	5.101	3825.8	-60	3765.8
2	MAY	1980	0	5.101	3825.8	-60	3765.8
2	MAY	1980	100	5.102	3826.5	-60	3766.5
2	MAY	1980	200	5.101	3825.8	-60	3765.8
2	MAY	1980	300	5.100	3825.0	-60	3765.0
2	MAY	1980	400	5.101	3825.8	-60	3765.8
2	MAY	1980	500	5.101	3825.8	-60	3765.8
2	MAY	1980	600	5.102	3826.5	-60	3766.5
2	MAY	1980	700	5.104	3826.0	-60	3766.0
2	MAY	1980	800	5.104	3831.8	-60	3771.8
2	MAY	1980	900	5.113	3834.8	-60	3774.8
2	MAY	1980	1000	5.116	3838.5	-60	3778.5
2	MAY	1980	1100	5.122	3841.5	-60	3781.5
2	MAY	1980	1200	5.125	3843.8	-60	3783.8
2	MAY	1980	1300	5.130	3847.5	-60	3787.5
2	MAY	1980	1400	5.132	3849.0	-60	3789.0
2	MAY	1980	1500	5.138	3853.5	-60	3794.5
2	MAY	1980	1600	5.140	3855.0	-59	3796.0
2	MAY	1980	1700	5.141	3855.8	-59	3796.8

### Gravity

The earth's gravity field was monitored during the station drift with a La Coste and Romberg Model G gravimeter. This instrument has a range of over 7000 milligals, a reading accuracy of  $\pm 0.01$  milligal and a drift rate normally less than 1 milligal per month. The instrument used, serial number 27, was especially modified for use on ice floes by the addition of variable damping and electronic readout. Gravity output was monitored continuously with a chart recorder but only those values read directly for calibrating the chart are reported here. The instrument was located in the Lamont residence hut at FRAM II where it was mounted on a wooden pier frozen into the ice floe. The pier extended through a hole in the floor of the hut and was free of any contact with the hut itself. The instrument was at an elevation of  $1/2$  m above sea level.

The gravity readings were calibrated with readings at Lamont, Thule and Nord. The manufacturer's screw curve for the instrument was checked between the gravity pier in the Oceanography Building at Lamont and Hangar #7 (SE corner, field level) at Thule AFB, Greenland. The difference in gravity between the two points is over 2600 milligals yet the difference based on the manufacturer's screw curve was found to give a gravity tie within 6 milligals of that based on the survey values for these two sites.

Site	Date	Base Surveyed Value (gals.)	Value based on G-27 Rds. (gals.)
Thule AFB HGR #7	24 Mar 80	982.9230	982.92205
Lamont Grav. Pier	7 May 80	980.2546	(980.2546)
Gravity Difference		2.6734	2.66745

Gravity based on our gravimeter readings using the screw curve agree with the accepted surveyed values with a difference of 5.95 milligals. This check provided confidence in the manufacturer's screw curve which was used to reduce all observations.

Drift is also a possible potential source of error. Readings were taken at the same site at Thule on both the trip to FRAM II and on return. The relative readings at Thule were:

24 March 80	6611.36 mgal
5 May 80	<u>6610.62 mgal</u>
Drift	0.74 mgal

The drift rate of 1/2 milligal per month is considered negligibly small and no drift corrections were made to the data.

## GRAVITY OBSERVATIONS AT FRAM II

Key to column headings:

DY = Day

MON = Month

YEAR = Year

GMT - Greenwich mean time

CTR RDG = Counter reading

MGALS = Relative gravity in milligals

GRAVITY = Absolute gravity value in milligals.

## FRA4 2 GRAVITY DATA

DY	MON	YEAR	GMI	CTR	RDG	MGALS	GRAVITY
31	MAR	1980	1956	6551.52	6897.45	983214.87	
31	MAR	1980	2235	6551.36	6897.68	983214.69	
1	APR	1980	57	6551.35	6897.67	983214.69	
1	APR	1980	824	6551.29	6897.60	983214.62	
1	APR	1980	1020	6551.43	6897.75	983214.75	
1	APR	1980	1830	6551.12	6897.42	983214.44	
3	APR	1980	950	6551.43	6897.75	983214.75	
4	APR	1980	1303	6549.75	6895.98	983213.00	
4	APR	1980	2341	6549.92	6896.16	983213.19	
5	APR	1980	946	6550.15	6896.40	983213.37	
5	APR	1980	1316	6550.30	6896.56	983213.55	
5	APR	1980	2330	6551.30	6897.61	983214.62	
6	APR	1980	1036	6551.25	6897.56	983214.56	
6	APR	1980	1622	6551.18	6897.40	983214.37	
6	APR	1980	2217	6550.85	6897.14	983214.37	
7	APR	1980	1039	6550.00	6896.88	983213.88	
7	APR	1980	1321	6550.07	6896.85	983213.88	
7	APR	1980	2142	6550.02	6896.52	983213.50	
8	APR	1980	957	6550.04	6896.81	983213.81	
8	APR	1980	1523	6550.00	6896.82	983213.82	
9	APR	1980	15	6550.05	6896.93	983213.94	
9	APR	1980	1055	6550.70	6896.98	983214.00	
9	APR	1980	1522	6550.50	6896.77	983213.75	
9	APR	1980	2130	6550.54	6896.81	983213.81	
10	APR	1980	1130	6550.58	6896.86	983213.86	
10	APR	1980	1530	6550.58	6896.86	983213.86	
10	APR	1980	2215	6550.76	6897.05	983214.05	
11	APR	1980	1040	6550.76	6897.05	983214.05	
11	APR	1980	1715	6550.76	6897.03	983214.03	
11	APR	1980	2356	6550.74	6897.04	983214.04	
12	APR	1980	1040	6550.74	6897.04	983214.04	
12	APR	1980	1712	6550.72	6897.11	983214.13	
12	APR	1980	2214	6550.75	6897.12	983214.13	
13	APR	1980	1175	6550.43	6897.12	983214.13	
13	APR	1980	2210	6550.41	6897.10	983214.13	
14	APR	1980	30	6550.76	6897.03	983214.03	
14	APR	1980	1040	6550.73	6897.01	983214.00	
14	APR	1980	1540	6550.73	6897.01	983214.00	
15	APR	1980	453	6550.55	6896.82	983213.82	
15	APR	1980	2123	6550.72	6897.01	983214.01	
16	APR	1980	453	6550.72	6897.01	983214.01	
16	APR	1980	1623	6550.74	6897.02	983214.02	
17	APR	1980	2531	6550.74	6897.02	983214.02	
17	APR	1980	1133	6550.75	6897.01	983214.01	
17	APR	1980	1133	6550.75	6897.01	983214.01	
17	APR	1980	2535	6550.76	6897.02	983214.02	
18	APR	1980	1140	6550.43	6897.23	983214.23	
18	APR	1980	1736	6552.87	6896.87	983213.87	
18	APR	1980	2227	6553.62	6896.86	983213.86	
19	APR	1980	1140	6552.41	6896.81	983213.81	
19	APR	1980	1510	6552.27	6896.84	983213.84	
20	APR	1980	1514	6551.10	6896.77	983213.77	
20	APR	1980	1233	6543.25	6896.77	983213.77	
20	APR	1980	1910	6543.32	6896.44	983211.44	
21	APR	1980	1837	6543.44	6896.44	983211.44	
21	APR	1980	2142	6543.60	6896.27	983210.27	
22	APR	1980	112	6543.24	6896.24	983209.24	
22	APR	1980	1123	6543.65	6896.24	983209.24	
22	APR	1980	1742	6542.11	6896.07	983217.07	
22	APR	1980	2224	6544.44	6896.00	983200.00	
23	APR	1980	1107	6555.10	6896.01	983200.01	
23	APR	1980	1415	6554.47	6896.34	983200.34	
23	APR	1980	2057	6553.70	6896.08	983200.08	
23	APR	1980	2534	6553.10	6896.45	983200.45	
24	APR	1980	1125	6553.42	6896.33	983200.33	
24	APR	1980	1211	6552.48	6896.13	983200.13	
24	APR	1980	1735	6552.00	6896.77	983200.77	
24	APR	1980	2537	6552.00	6896.02	983200.00	

## FR44 2 GRAVITY DATA

DY	MON	YEAR	GAT	CIR RDG	MGALS	GRAVITY
25	APR	1980	1203	6521.60	6866.34	983183.31
25	APR	1980	1213	6518.67	6863.25	983180.25
25	APR	1980	2214	6518.33	6860.79	983177.81
26	APR	1980	1350	6514.20	6858.54	983175.56
26	APR	1980	1359	6513.45	6857.75	983174.75
26	APR	1980	2208	6512.78	6857.05	983174.06
27	APR	1980	55	6513.04	6857.32	983174.31
27	APR	1980	1322	6513.04	6857.32	983174.31
27	APR	1980	1730	6513.01	6857.29	983174.31
28	APR	1980	1346	6513.06	6857.34	983174.31
28	APR	1980	2129	6514.01	6858.34	983175.31
28	APR	1980	2315	6514.21	6858.55	983175.56
29	APR	1980	1338	6516.56	6860.97	983178.00
29	APR	1980	1904	6517.31	6861.82	983178.81
29	APR	1980	2320	6518.11	6862.86	983179.69
30	APR	1980	1210	6520.58	6865.20	983182.25
30	APR	1980	2128	6522.03	6866.76	983183.81
1	MAY	1980	1337	6522.65	6867.65	983184.62
2	MAY	1980	513	6519.01	6863.61	983180.62



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